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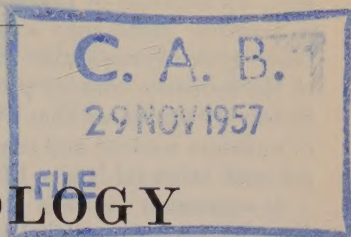
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REVIEW

OF

APPLIED MYCOLOGY



VOL. XXXVI

NOVEMBER

1957

Literature references in [] refer to the *Review of Applied Mycology*.
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BAZZIGHER (G.). **Pilzschäden an Kastanien nördlich der Alpen.** [Fungal damage to Chestnuts north of the Alps.]-*Schweiz. Z. Forstw.*, 107, 11, pp. 694-695, 1956. [Received July, 1957.]

Chestnut wilt caused by *Mycosphaerella maculiformis* [cf. 33, p. 459] was reported from various parts of Switzerland in 1955. Severe damage to about 80 per cent. of chestnut trees in the region of the Lake of Geneva, particularly near Evian, was caused in 1956 by *Diplodina castaneae* [cf. 35, p. 55] and *Melanconia pernicioso* [cf. 18, p. 355], the spread of these two fungi being favoured by the cool, wet summer, which also contributed to the unusually high incidence of *Armillaria mellea* [cf. 26, p. 320] on trees of all ages.

Increased fungal damage to forest trees is foreseen for the near future and immediate removal of dead or decaying trees is recommended.

CAROSELLI (N. E.). **Juniper blight and progress on its control.**-*Plant Dis. Repr.*, 41, 3, pp. 216-218, 1 fig., 1957.

In fungicide trials at the Rhode Island Agricultural Experiment Station, Kingston, in 1955 and 1956, for control of juniper blight (*Phomopsis juniperovae*) [29, p. 68], on seedlings of *Juniperus* sp. the best results were obtained with kromad (Mallinckrodt Chemical Co.) [cf. 36, p. 650], merbam (Chipman Chemical Co.), and WK-34 (Upjohn Co.) at 2, 1, and 1.2 oz. in 10 gals. water, respectively, applied five times from late June to late September. In 1955 11.4 per cent. of plants treated with kromad became infected, as against 10.9 for merbam, 16.4 for WK-34, and 26.5 for the control, while in 1956 the figures were respectively 7.9, 11.2, 6.6, and 40.3. The greater density of the two-year-old plants in 1956 may have augmented the disease.

BUTIN (H.). **Untersuchungen über Resistenz und Krankheitsanfälligkeit der Pappel gegenüber *Dothichiza populea* Sacc. et Br.** [Studies on the resistance and susceptibility to disease of the Poplar in relation to *Dothichiza populea* Sacc. et Br.]-*Phytopath. Z.*, 28, 4, pp. 353-374, 1 fig., 1 diag., 1 graph, 1957.

At the Institute for Forest Mycology, Hann.-Münden, Germany, inoculation experiments were performed with *Dothichiza populea* on stem and branch sections of four- to five-year-old poplars (*Populus deltoides*) [35, p. 797; 36, p. 289] to determine the influence of temperature and moisture content on susceptibility to bark canker.

Predisposition to infection was enhanced by a decline of turgescence in the cortical cells. At 20° C. sections of 1 cm. in diameter reach the threshold of susceptibility

with a loss of 10 per cent. of the total moisture content, as compared with 20 per cent. for infection by *Cytospora chrysosperma* [*Valsa sordida*: 35, p. 249]. Similarly, a 'positive' result may also be achieved by a temperature reduction of 4° or 8°. Since green sections also contract the disease under these conditions, the status of the moisture content presumably possesses no general validity as a resistance factor. It was shown that within the temperature range of 4° to 23° the two factors of moisture content and temperature may mutually intensify, weaken, or counteract each other [cf. 16, p. 572].

A connexion between the formation of a wound periderm and the result of inoculations was revealed by microscopic examination, extensive lignification of the cell membranes and the development of periderm both inducing resistance to the spread of the pathogen. Since wound periderm production is in its turn conditioned by temperature and moisture content, a relationship ultimately emerges between these environmental factors, the reactive capacity of the host, and its susceptibility to disease.

In the colonization of the bark *D. populea* proceeds in the first place along the intracellular route at a rate dictated by the moisture content. Infection of the tissues is incited by the toxic metabolic products of the fungus which diffuse ahead of the advancing hyphae. Hence the agent of poplar bark canker should be assigned to the perthophytes [9, p. 47].

The facts elicited are compared with those obtained by other workers, and the position of *D. populea* as a 'facultative' or 'seasonal' parasite is discussed.

VIVANI (W.). **Notes sur la 'Batteriosi' du Peuplier.** [Notes on the 'bacteriosis' of Poplar.]—23 pp., Istituto di Sperimentazione per la Pioppicoltura, Casale Monferrato, Italia, 1957. [Mimeographed.]

An account is given of studies on bacterial disease of poplar [30, p. 637] conducted in north-eastern Italy since 1943, when the disease was first reported to the Institute of Experimentation on Poplar Cultivation, Casale Monferrato, as severely affecting trees of all ages on a farm in the District of Alessandria. Since then, the clones I. 214 and 455 [loc. cit.] have been successfully substituted there.

The author regards the name 'bacteriosis' as most suitable to describe the Italian condition because, although the disease is unquestionably identical with Ciferri's 'bacterial canker' [loc. cit.], it may not be the same as bacterial canker or 'sweating canker' ('chancre suintant') in other countries [13, p. 408; 25, p. 323, *et passim*].

The characters of the disease, and its geographical distribution, hosts, and harmfulness are noted. Isolations since 1943 from affected material have in no instance given *Micrococcus populi* [11, p. 612], but only bacteria, inoculations with which were inconclusive.

TOOLE (R. E.). **Status of Sweetgum blight, 1956.**—Abs. in *Phytopathology*, 47, 5, p. 314, 1957.

Observation of blight of sweetgum [*Liquidambar styraciflua*: 35, p. 561] in the Mississippi delta over four years has shown intensification of the disease, mortality varying in eight areas from 0 to 67 (average 16) per cent. A large proportion of the fine roots of diseased trees are dead, but the cause is still unknown. No likely parasite has been found and minor element injections have given negative results. The disease appears to be worst on bottomland soils that tend to dry out readily.

BAKSHI (B. K.), PURI (Y. N.), & SINGH (B.). **Two decay fungi on conifers in the Himalayas.**—*Indian J. mycol. Res.*, 1, 1-2, pp. 75-79, 1 pl., 2 figs., 1955. [Received April, 1957.]

Lentinus lepideus on fallen logs of spruce (*Picea morinda*) and blue pine (*Pinus*

excelsa) and *Poria ferruginosa* on coniferous building timber, both in the Himalayas, are new records for India.

BANERJEE (S.). A disease of Norway Spruce (*Picea excelsa* (Lam.) Link) associated with *Stereum sanguinolentum* (A. et S.) Fr. and *Pleurotus mitis* (Pers.) Berk.—*Indian J. mycol. Res.*, 1, 1–2, pp. 1–30, 8 pl., 1 fig., 1955. [Received April, 1957.]

About 20 per cent. of the trees in a 40- to 60-year-old mixed stand of Norway spruce (*Picea excelsa*) in Glentress Forest, Scotland, were attacked by a rot which was investigated in 1949. *Stereum sanguinolentum* [33, p. 570] and *Pleurotus mitis* [cf. 17, p. 214] were isolated from dying trees and both were found capable of attacking healthy trees through wounds. Symptoms of the disease included fluting of the stem and copious resin flow through cracks in the bark. Lesions occurred most commonly round pruning wounds.

The fruit bodies of the two pathogens formed in nature and in culture, and the microscopic characteristics of the rots are described.

This is the first record of *P. mitis* causing a serious decay of living trees in Great Britain.

KLYUSHNIK (P. I.). Коренева губка *Fomes annosus* (Fr.) Cke. [Root fungus *Fomes annosus* (Fr.) Cke.]—Укр. Бот. Журн. [*J. Bot. Acad. Sci. Ukr.*], 12, 3, pp. 97–105, 3 figs., 1955. [Russian summary.]

A description, based on the author's observations in the Ukraine, is given of *Fomes annosus* [cf. 36, p. 291] and its effect on pine. Conditions favourable to the development and spread of the fungus in pine stands are described. Control includes growing pines in mixed forests with birch or oak, thinning the stands, felling dried or weak trees, rooting out stumps and burning them or treating them chemically after felling, and the regular examination of young plantings, which should be at least seven to eight m. from the old. If one or two trees are infected per ha., digging round the area is recommended; if there are more, the infected trees should be felled; and if more than 40 per cent. are infected the stand should be replaced by a mixture of pine and broad-leaved species.

Cypress canker in Tasmania.—*Tasm. J. Agric.*, 28, 2, pp. 168–169, 2 figs., 1957.

Cypress canker, caused by *Monochaetia unicornis* [cf. 35, p. 357], has been increasing in severity in recent years in Tasmania. The use of the susceptible Monterey cypress (*Cupressus macrocarpa*) as a windbreak should be replaced by the resistant *C. benthami* or *C. torulosa*.

WAGER (V. A.). **Common diseases of vegetables in South Africa.**—176 pp., 182 figs., Department of Agriculture, Pretoria, 1956. 12s.

In this reference booklet for South African vegetable growers the diseases are grouped under the host names arranged alphabetically. Each disease is illustrated by a photograph and some by spore drawings of the fungus responsible, and a brief description given of the symptoms, causal organism, and control, in English and Afrikaans. The Latin names of the pathogens are indexed.

ROWE-DUTTON (PATRICIA). **The mulching of vegetables.**—*Tech. Commun. Bur. Hort.*, E. Malling, 24, 169 pp., 5 pl., 1957. 20s.

Among the effects of mulching on the growth and cropping of vegetables, discussed in the light of some 350 references in this useful booklet, attention is drawn to the influence of this practice on the incidence of diseases of cucurbits (pp. 32–33), lettuce (pp. 42–45), peas and beans (pp. 64–65), potatoes (pp. 86–87), [chilli] peppers and eggplants (pp. 116–117), and tomatoes (pp. 134–136).

NATTI (J. J.). **Control of downy mildew of Broccoli with antibiotics.**—Abs. in *Phytopathology*, 47, 4, pp. 245–246, 1957.

Of a number of antibiotics which inhibited *in vitro* spore germination of *Peronospora parasitica* [at Cornell Agricultural Experiment Station] none was effective when sprayed on to leaves of broccoli inoculated with this pathogen [cf. 36, p. 76] three hours and also six days afterwards; streptomycin at 50 and 100 p.p.m. proved moderately effective, the more so in the presence of glycerol, or when the plants were constantly misted.

MEIER (W.). **Die Vergilbungskrankheit der Rüben und ihre Bekämpfung.** [Beet yellows disease and its control.]—*Mitt. schweiz. Landw.*, 5, 4, pp. 65–71, 1 fig., 1 graph, 1957.

At the Zürich-Oerlikon Experiment Station, Switzerland, in 1956, incidence of beet yellows virus [34, p. 211] was 1.4 and 2.9 per cent. in early- and late-sown beet varieties, respectively, the reduction in sugar being 1.8 and 6.4 per cent., respectively.

Tests with a systemic 20 per cent. thiometon emulsion gave partial control of the disease in the Berese lake region and the Lausanne area, but comparison of the weight, sugar content, and sugar yield of symptomless and yellows-affected beets from treated and untreated plots in no case indicated an inhibition of the damaging effect of the disease on the treated plants. Furthermore, as a result of the very small number of primary foci (secondary infections being only occasionally observed) the increased yield through reduction of the number of yellows-affected plants was not significant.

GÜRTÜRK (S.), ÖZKAN (M.), & BASKAYA (H.). **Elektronenmikroskopische Untersuchungen der Mischinfektionen von Cucumber Virus 1 und Beta Virus 4 am Spinat in der Türkei.** [Electron-microscopic studies of mixed infections of Cucumber virus 1 and Beta virus 4 on Spinach in Turkey.]—*Phytopath. Z.*, 29, 1, pp. 75–78, 2 figs., 1957.

A disease of spinach new to Turkey was shown by electron-microscopic studies at the Veterinary Medicine Faculty, University of Ankara, to be caused by a mixed infection with cucumber mosaic and beet yellows viruses [cf. 34, pp. 426, 703; 35, p. 355, *et passim*]. The size of the particles of the former virus ranged from 40 to 80 m μ [cf. 32, p. 298].

HARE (W. W.). **Inheritance of resistance of Fusarium wilt in Cowpeas.**—Abs. in *Phytopathology*, 47, 5, pp. 312–313, 1957.

In breeding trials with cowpea [? in Mississippi] for resistance to *Fusarium oxysporum* f. *tracheiphilum* [*F. bulbigenum* var. *tracheiphilum*: cf. 35, p. 743] the variety Iron, resistant to races 1, 2, and 3 of the pathogen, was crossed with Extra Early Blackeye, Purple Hull Bunch, and Mississippi Crowder, all resistant to 1, and susceptible to or tolerant of 2 and 3. The results indicated that resistance to races 2 and 3 depends on two dominant genes.

ZAUMEYER (W. J.) & THOMAS (H. R.). **A monographic study of Bean diseases and methods for their control.**—*Tech. Bull. U.S. Dep. Agric.* 868, 255 pp., 37 figs., 3 maps, 1957.

In the revised edition of this useful bulletin [cf. 24, p. 260] the fungus, bacterial, virus, and non-parasitic diseases of field and garden (*Phaseolus vulgaris*) and Lima (*P. lunatus*) beans are fully described and illustrated. There is a bibliography of 1,207 titles.

ANDERSON (C. W.) & CORBETT (M. K.). **Virus diseases of Peppers in Central Florida. Survey results 1955.**—*Plant Dis. Repr.*, 41, 3, pp. 143–147, 1957.

Studies in 1955 by the Florida Agricultural Experiment Station, Gainesville, on the distribution, relative prevalence, and seasonal occurrence of virus diseases of [chilli] pepper (*Capsicum frutescens*) showed viruses to be present in 36 of the 57 fields examined.

The most widespread virus was found to be tobacco etch virus [33, p. 402], most of the isolates in 15 fields being obtained from chilli plants with symptoms described as 'vein-banding crinkle'. Most fields remained free from this disease until late May. Twelve isolates of tobacco mosaic virus [34, p. 580] were obtained from chilli plants in nine fields, some plants displaying a 'ring mottle' and others the more typical mottle associated with this virus. Several plants showed the yellow-pod symptoms [loc. cit.]. Fifteen isolates of potato virus Y [32, p. 8] were obtained from chilli plants in 10 fields. Field infected plants displayed a 'vein-banding crinkle'. Cucumber mosaic virus [36, p. 567] was obtained from eight fields, but in six of these the isolates were from plants other than chilli. Aster ringspot virus [33, p. 675] was found in most of the fields surveyed in Seminole and Volusia counties, but nowhere else. Yellow pod disease was the most serious pod disorder.

Severe virus damage to chilli plants was associated with the proximity of various weed hosts. Tobacco etch and potato Y viruses were isolated from *Solanum nigrum*, *S. gracile*, and *Physalis angulata*, tobacco mosaic virus from *P. elliotii*, and cucumber mosaic virus from *Commelina nudiflora* [cf. 34, p. 699], *Vinca rosea*, and cowpea.

AZAD (R. N.). **Mutation in Cucumis virus 2c.**—*Indian Phytopath.*, 9, 1, pp. 80–82, 2 figs., 1956.

Some of this information on a mutant of *Cucumis* virus 2c [cucumber green-mottle mosaic virus] has been noticed from another source [35, p. 279]. Mutation is particularly frequent in hot weather. The mutant strain is distinctly more virulent than the type virus on bottle-gourd (*Lagenaria siceraria*) and other hosts.

HORN (N. L.), WILSON (W. F.), & GIAMALVA (M.). **Seed and insect transmission of Cucumber anthracnose.**—*Plant Dis. Repr.*, 41, 2, pp. 69–71, 1957.

In greenhouse studies at the Louisiana State University Experiment Station, Baton Rouge, cucumber anthracnose (*Colletotrichum lagenarium*) [35, p. 811] was found to be seed-transmitted in six out of 50,000 seedlings grown from commercial seeds. The fungus was also transmitted to potted plants by *Diabrotica undecimpunctata howardi* [33, p. 520], artificially infested or collected from a field where diseased plants were growing. Seedlings did not become infected in soil which had been infested with *C. lagenarium* ten months earlier, although sowing immediately after infestation resulted in 100 per cent. infection.

VAN GUNDY (S. D.) & WALKER (J. C.). **Seed transmission, overwintering, and host range of the cucurbit-angular-leaf-spot pathogen.**—*Plant Dis. Repr.*, 41, 3, pp. 137–140, 4 figs., 1957.

Of 13 lots of cucumber seed grown in California and Oregon, which were tested at the University of Wisconsin, Madison, in 1953–4, ten were found to carry *Pseudomonas lacrymans* [31, p. 273; 35, p. 810], which was obtained from cotyledonary lesions in seedlings of the samples tested.

The organism was also found to persist in infested soil or plant debris throughout one Wisconsin winter, and during the growing season soil near infected vines became infested. The pathogen remained viable in dry leaf tissue for two and a half years.

In host range studies in the field and greenhouse all of the various commercial

and ornamental cucurbit species tested became infected, foliage and fruit symptoms being most severe on West Indian gherkin (*Cucumis anguria*) and cucumber, respectively.

ERDMAN (L. W.), JOHNSON (H. W.), & CLARK (F.). **Varietal responses of Soybeans to a bacterial-induced chlorosis.**—*Agron. J.*, 49, 5, pp. 267–271, 1957.

In pot tests at the United States Department of Agriculture, Beltsville, Maryland, in 1956, 40 varieties of soy-bean were tested with strains 31, 76, and 77 of *Rhizobium japonicum*, the last two of which induce chlorosis in the variety Lee (*Plant Dis. Rept.*, 40, p. 646, 1956). No chlorosis occurred in Blackhawk, Harosoy, Virginia, Tanner, CNS, Palmetto, Fe 33123, Improved Pelican, Otootan, or Yelnando, and Patoka, Laredo, Rokusun, Jackson, Biloxi, J.E.W. 45, and Seminole showed negligible susceptibility. In Lincoln, Grant, Norchief, Chippewa, Hawkeye, Dunfield, Clark, Perry, Wabash, Luthy, and Arksoy susceptibility was light or variable, while Aoda, Chief, Dorman, Dortchsoy 31, C-1068, and S-100 were moderately susceptible, and Lee, Roanoke, Gibson, Ogden, PI-54619-5-1, and D51-4888 highly susceptible.

BUKOVSKY (T.). Разведение Шампиньонов. [Mushroom cultivation.]—71 pp., Agricultural State Publisher, 1956. Roubles 2.50. [Reviewed in *Природа* [*Nature = Priroda, Moscow*], 46, 3, p. 123, 1957.]

This handbook, translated from Polish, is devoted to the cultivation of mushrooms by large-scale and individual growers. It contains a section on mushroom diseases and their control with chemicals.

CRALL (J. M.) & SCHENCK (N. C.). **Occurrence and fungicidal control of Watermelon foliage diseases in Florida.**—Abs. in *Phytopathology*, 47, 5, p. 312, 1957.

Spray trials at Leesburg during 1953–6 on watermelon were concerned with the control of *Pseudoperonospora cubensis* [35, p. 299], *Mycosphaerella citrullina* [*M. melonis*: 35, p. 510], *Colletotrichum lagenarium* [35, p. 373], and *Cercospora citrullina* [29, p. 74]. For the first named dithiocarbamates and copper fungicides were equally effective and captan inferior to both, but for the remainder the dithiocarbamates were more effective, and the copper fungicides proved slightly phytotoxic. Wettable powder formulations of zineb and maneb bettered tank mixes. Zineb at 2 lb. per 100 gals. is recommended but maneb at 1½ lb. is a possible substitute.

AGULHON (R.) & AMPHOUX (M.). **Essais de lutte contre la pourriture grise.** [Experiments for control of grey rot.]—*Progr. agric. vitic.*, 147, 27–28, pp. 13–18, 1957.

Of eight fungicides tested at Beaucaire-Tavernel, France, for control of grey rot [*Botrytis cinerea*: 34, p. 129] on Maccabeu and Gros Vert vines, none effectively prevented the spread of the disease, either on bunches already infected or on those which were healthy at the time of treatment.

SANTILLI (V.). **A physiologic form of *Plasmopara viticola* found for the first time.**—Abs. in *Phytopathology*, 47, 1, p. 30, 1957.

Plasmopara viticola occurs in California only on the wild vine (*Vitis californica*) [cf. 35, p. 86]. By inoculation and comparison with *P. viticola* on vines in the eastern United States [27, p. 509] the Californian fungus has been shown to be a physiologic race unable to complete its life-cycle on the vine. Only *V. californica*, *V. girdiana*, *V. arizonica*, and *V. treleasei* were susceptible to the Californian fungus, which produced milder symptoms on the first named than *P. viticola* from vine.

BOUBALS (D.). **Sur le comportement des Vitacées à l'égard du mildiou de la Vigne.** [On the behaviour of Vitaceae towards Vine mildew.]—*Progr. agric. vitic.*, 147, 24–25, pp. 332–334, 2 figs., 1957.

The information contained in this paper on the necrotic reactions produced in vine leaves inoculated with *Plasmopara viticola* has already been noticed [36, p. 571].

NISHIMURA (S.). **Relation between the changes of some chemical components in Grape fruits due to ripening and the outbreak of ripe rot of Grape (Grape anthracnose).**—*Forsch. PflKr., Kyoto*, 6, 1, pp. 11–23, 1 diag., 12 graphs, 1956. [Japanese, with English summary.]

Results of studies at Kyoto University on the growth of *Glomerella cingulata* from grapes in Richards' solution showed the utilization of sugar by the fungus to be a distinct phenomenon from the decomposition of sugar. Mycelial growth in Richards' solution containing glucose alone was less than with a combination of glucose and fructose at the same concentration, and in the latter medium was less than the sum of the yield from glucose and fructose alone. Adjusted with hydrochloric or sulphuric acid, optimum pH for growth of the fungus was 3.9 to 4 and 5.9 to 6, but with tartaric and citric acids it was 2.9 to 3.1 and 5.85 to 6. There appeared to be a correlation between the sugar content and pH value, or tartaric acid concentration, of grape juice, and the incidence of *G. cingulata* on the grapes [cf. 35, p. 623]. Where the sugar concentration exceeds 7 to 8 per cent. and the pH of the juice is 2.8 to 2.9 severe infection will occur.

KÖHLER (E.). **Über die Beziehung zwischen Viruskonzentration von Impflösungen und Infektionshäufigkeit. II. Das übereinstimmende Verhalten verschiedener Virusarten.** [On the relation between the virus concentration of inoculum solutions and infection frequency. II. The conformable behaviour of different virus species.]—*Phytopath. Z.*, 28, 4, pp. 451–456, 6 graphs, 1957.

The results of experimental studies by different workers on tobacco and tomato mosaic, potato X, tomato spotted wilt, and southern bean mosaic viruses [16, pp. 497, 778; 17, p. 210; 25, p. 326] are considered to demonstrate the universal validity of the conclusions drawn by the author and D. Köhler [36, p. 172] regarding the straight-line relationship between infection frequency and virus concentration in tobacco mosaic. The infection dilution curve follows the law of chance, resulting in normal distribution of the lesions.

ROLAND (G.). **L'histotropisme des virus.** [Virus histotropism.]—*Parasitica*, 13, 1, pp. 31–35, 1957.

After defining histotropism as the characteristic shown by some viruses of multiplying more abundantly in certain tissues of their plant-hosts than in others, the author discusses the subject in the light of 31 references to the literature. Examples are given both of viruses localized in different parts of their hosts and of those which do not appear to be confined to particular tissues, and reference is made to the relation between the histological distribution of viruses within their hosts and the manner of their insect transmission.

It is concluded that a knowledge of the histological distribution of viruses in plants may greatly facilitate investigation of their mode of transmission. Methods of virus identification based on a study of their cellular inclusions should also be developed.

CIFERRI (R.). **Le virosi delle piante in Nordamerica ed in Europa.** [The viroses of plants in North America and in Europe.]—*Coltivatore*, 102, 7, pp. 154–155, 1956. [Received June, 1957.]

During a recent journey across the United States the author concluded that

virus diseases of cultivated plants are much more numerous and of greater economic importance there than in Europe, particularly in Mediterranean areas, and new ones are constantly being noted. About 50 virus diseases have been found in stone fruit crops in the United States, ten or more of which are sometimes of serious economic importance, whereas in Italy the same hosts are affected by only ten or twelve viruses in all, only two or three of which may affect production. There appear to be no virus diseases affecting cherry in Italy [but cf. 36, p. 653]. Vines in the United States are affected by at least three viroses, whereas in Italy only one is known.

The author attributes this situation mainly to the fact that in North America (apart from California and the Middle West) most of the farms are still surrounded by the original woods and fields, and in addition more weeds (reckoned both as individual plants and by species) are present than in Europe. In Mediterranean Europe much of the original vegetation has been destroyed, or where it remains (as in the Alps and Apennines) there is little cultivation.

SUHOV (K. S.) & VOVK (A. M.). Столбур пасленовых. [Stolbur of solanaceous plants.]—103 pp., 5 col. pl., 39 figs., U.S.S.R. Academy of Sciences Publishers, Moscow-Leningrad, 1949. [Received 1957.] Roubles 4.40.

Following a general introduction to virus diseases, the authors trace the history of the stolbur virus and its vector (*Hyalesthes obsoletus*) with particular reference to the U.S.S.R. [36, p. 87]. Symptoms produced on tomato, [chilli] pepper, eggplant, potato, and tobacco are described. A large section is devoted to the occurrence and control of the disease on Solanaceae, host susceptibility, and the ecology of the virus. *Convolvulus arvensis*, *Lepidium draba*, to some extent chicory, endive, *Cirsium oleracea*, *Hyoscyamus niger*, and *Datura stramonium*, and very occasionally *Solanum nigrum*, are infected and serve as reservoirs of the virus, the first two in particular as they are also the main food plants for the vector. In the section on classification (pp. 87–91) differences between the Australian stolbur (tomato big bud virus) and the disease occurring in the U.S.S.R. are pointed out. Symptoms of the former on tomato differ from southern stolbur and are closer to some variants of northern stolbur. *Cynodon dactylon* is susceptible to the Australian virus but immune from southern stolbur. Neither the Australian nor the northern stolbur causes wilting of any of the Solanaceae, whereas southern stolbur does (in potato, chilli, eggplant, and petunia). In addition, the Australian virus has a different vector, *Thamnotettix argentata* [*Orosius argentatus*: 35, p. 49], and there appears so far to be no record of the transmission of one virus by insects belonging to different families. Differences between the southern and the northern stolbur have already been noticed [36, p. 87]. A bibliography of 57 titles is appended.

Türkei. Verhütung der Einschleppung des Rindenkrebses der Edelkastanie (*Endothia parasitica*). Verordnung Nr. 4/4375 vom 7. Februar 1955. [Turkey. Prevention of the introduction of Chestnut bark blight (*Endothia parasitica*). Order No. 4/4375 of 7th February, 1955.]—*Amtl. PflSchBestimm.*, N.F., 10, 1, p. 68, 1957.

To prevent the introduction into Turkey of *Endothia parasitica* the above-mentioned Order (published in the State Gazette of 17th March, 1955) prohibits the import of plants and parts thereof, and of wood (including timber and wood products but excluding completely decorticated, heat-dried material) of chestnut, oak, beech, *Acer*, *Rhus*, and hickory (*Carya*).

BORZINI (G.). **Note fitopatologiche per l'anno 1955.** [Phytopathological notes for the year 1955.]—*Boll. Lab. sper. Fitopat. Torino*, N.S. 19 (1956), 1, pp. 3–61, 18 figs., 8 graphs, 1957. [English summary.]

In this Bulletin, publication of which was suspended in 1942, it is stated that

the following diseases were among the many observed during 1955 by the Experimental Laboratory and Observatory of Phytopathology, Turin [cf. 18, p. 572]: *Coniothyrium* [*Coniella*] *diplodiella* [cf. 35, p. 414] on vines in the vicinity of Astigiano and in Acqui; *Gymnosporangium sabiniae* [35, p. 748] on pears near Biella; a silver leaf disease of peach, associated with (?) *Fomes* sp., at Cuneo, first observed in 1952, and which by 1955 had killed 8 per cent. of the trees, a further 10 per cent. being clearly infected; marrow wilt in two localities caused by *Phytophthora parasitica*, sometimes in association with *Fusarium solani*; *Septoria tiliae* on wilted lime trees (*Tilia europea*) near Pino Torinese; *Rhizoctonia violacea* var. *asparagi* [cf. 32, p. 603] on asparagus at Astigiano, and elsewhere *Puccinia asparagi* [cf. 35, p. 91]; and serious gladiolus yellows (*F. orthoceras* var. *gladioli*) [29, p. 261] in some localities.

More detailed notes are given on some of the diseases. For example, the 'moria' disease of chillies may be differentiated into wilt (*Fusarium* spp.) [36, p. 446], collar rot usually associated with *Pythium* spp. (including *P. ultimum* and *P. spinosum*) and more rarely with *Phytophthora* spp. (especially *P. parasitica*), and foot rot mainly due to *P. capsici* and *P. parasitica* followed by *F.* spp. Fruits are attacked by both *P.* spp.

Сборник трудов по защите растений. Материалы первой конференции по вопросам защите растений (Рига, Март 1956 г.). [Plant protection bulletin. Materials of the first conference on problems of plant protection (Riga, March 1956).]—266 pp., 18 figs., 22 graphs, 1 map. Latvian S.S.R. Academy of Sciences Publishers, Riga, 1956. Roubles 11.95.

In the diseases section (pp. 163–229) of this report, A. Y. MINKYAVICHUS (pp. 163–168) states that the most important rust diseases of cereals in Lithuania are *Puccinia graminis* and *P. glumarum*, affecting most of the crops, *P. triticea* on wheat, *P. dispersa* on rye, *P. anomala* [*P. hordei*] on barley, *P. coronifera* [*P. coronata*] on oats, and *P. maydis* [*P. sorghi*] on maize. *P. graminis* and *P. coronata* are controlled by the eradication of their alternate hosts, barberry and *Rhamnus cathartica*, respectively. Other rusts of importance include *Uromyces pisi* on peas; *P. pringsheimiana* on currants and gooseberries; *Tranzschelia* [*P.*] *pruni-spinosae* on plum; *Cronartium ribicola*, particularly on black currants; *Melampsoridium betulinum* on birch; *Melampsora pinitorqua* on pine; and *M. larici-populina* on larch and poplar.

M. Y. MICHENS (pp. 169–173) deals with the occurrence and control of *P. coronata* in Latvia, where it is one of the most widespread and serious pathogens of oats, losses in yield reaching 50 per cent. in some years.

V. K. KALNUIN'SH (pp. 175–180) reports that in experiments in 1954 *Trichoderma lignorum* [*T. viride*: 36, p. 485], or the substance (trichodermin) produced by it, was antagonistic to *Fusarium lini* and *F. avenaceum*, preventing the infection of flax and wheat, respectively.

Discussing the importance of saprophytic soil fungi in the control of plant diseases [loc. cit.] V. V. UPITIS (pp. 181–190) states that under Latvian conditions species of *Penicillium* and *Trichoderma* are frequently encountered, *Trichothecium*, *Aspergillus*, and *Chaetomium* appearing less often. These fungi may be incorporated in the rhizosphere of the plants, or cultures used for treating seeds or soil, or seeds or plants may be treated with antibiotic extracts.

As a result of experiments conducted in Latvia in 1949–50, G. D. GUBAR' (pp. 191–195) recommends applications of boracic fertilizer (5 kg. per ha.) for the prevention of bacteriosis (*Bacillus* [*macerans*]) of flax [cf. 14, p. 634] on soils with reactions alkaline or near to neutral, marshy, dark soils of the plains, newly cultivated virgin soils, deposited soils, and soils treated with lime during crop rotation.

A. G. MARLAND (pp. 197–203) reviews factors influencing the forecasting of potato blight (*Phytophthora [infestans]*) in Estonian S.S.R.

L. P. PETERSON (pp. 205–213) reports on the recent occurrence in the Latvian Republic of three little-known virus diseases of apples, namely, apple mosaic virus transmitted by *Aphis pomi* and *Psylla mali*, apple spotting (bitter pit, blotchy cork, or apple blister), and little leaf which is transmitted by grafting and inoculation. Control measures include the avoidance of diseased material for grafting purposes and control of the vectors.

Ascochyta pisi and *A. pinodes*, among the most serious pathogens of peas in Latvia, are described by Mme R. I. MIHEEVA (pp. 223–229). Control consists mainly in the selection of healthy planting material; seed disinfection with 50 per cent. thiram (8 gm. per kg.) or granosan (5) both six to 12 days before planting, or with mercuran (2) two days before; early sowing; and timely harvesting.

Eighth Annual Report of the Commonwealth Scientific and Industrial Research Organization for the year 1955–56.—Canberra, 179 pp., 1956. [Received 1957.]

In the microbiology section (pp. 23–25) of this report from Australia [cf. 36, p. 379] it is stated that in further studies on the active resistance of plants suprasensitive to fungal attack an antibiotic substance separable by dialysis into two components was extracted from French bean [*Phaseolus vulgaris*] pods following infection by *Sclerotinia fructicola*. The preparation remained fungicidal over a wide pH range, in the presence of nutrients, and after frozen storage for three months.

The wounding of potato tuber tissue resulted in increased resistance to *Phytophthora infestans* in the cell layers adjacent to the cut surface prior to cutinization.

Stone fruits infected by *S. fructicola* produced a gas which in adjacent healthy fruits caused increased pigmentation, premature softening, and chlorophyll decomposition in the flesh without an increase in sugar content.

When two strains of tobacco mosaic virus were inoculated into the same plant and the mixture was reisolated two components indistinguishable in biological properties from the original strains were resolved by continuous flow paper electrophoresis. The same technique has been applied to separate naturally occurring mixtures of plant viruses.

In the fruit investigations section (p. 25) it is reported that the use of diphenylamine wraps has given better control of apple scald [36, p. 326] than any previous treatment.

In the section dealing with tobacco investigations (pp. 25–26) it is stated that blue mould [*Peronospora tabacina*] spread to all the leaves of field-grown tobacco side-dressed with inorganic nitrogen, but was not severe on plants grown in soil rich in organic nitrogen. The most rapid spread in plants low in nitrogen was in rapidly growing leaves nearing full size. Neither zineb nor streptomycin controlled the disease, this and other evidence suggesting that the strains of *P. tabacina* in Australia are different from those occurring in the United States [cf. 36, p. 357].

Soil filtrates containing the factor responsible for tobacco frenching were inactivated by boiling for a few minutes.

New plant diseases.—*Agric. Gaz. N.S.W.*, 68, 4, p. 204, 1957.

Among new diseases reported in New South Wales for the six months ended 31st December, 1956 [cf. 36, p. 177] are *Sclerotium cepivorum* on shallot [map 331], *Stromatinia narcissi* [cf. 31, p. 607] on *Narcissus*, *Centrospora acerina* on nemesia, *Phytophthora cryptogea* [map 99] on potato, and *Cercospora herpotrichoides* [map 74] on wheat.

Annual Report of the Department of Agricultural Research, Federation of Nigeria, for the year 1954–55.—24 pp., 1957.

In the section of this report (the first of the new Federal Department) [cf. 36,

p. 379] dealing with plant pathology (pp. 13–16), S. R. CHANT states that investigations are being made in Nigeria into the effect of mosaic virus on the leaf area of cassava, with special reference to the variety GCH 7, in an attempt to correlate symptom severity with yield [cf. 36, p. 163]. The incidence of crinkling and distortion appears to be greater in older than in younger leaves, the reverse occurring with the mosaic symptom alone. The virus was transmitted from affected to healthy cassava by means of white flies (*Bemisia* sp.) [16, p. 16]. Attempts at hot-water treatment control showed the thermal death-point of the virus to be higher than that of cuttings. No reduction in symptom expression was induced by chemotherapeutic methods.

The suspected virus disease of yams at Upper Ogun Estate [36, p. 380] has also been observed in the Ogbomosho and Oyo areas, in the latter of which it was first seen in 1935.

C. A. THOROLD reports that in one trial the best control of cacao black pod [*Phytophthora palmivora*] was given by 1 per cent. carbide-Bordeaux (7.4 per cent. affected pods). Perenox at 0.4 per cent. was nearly as effective, with 9.8 per cent. black pods, but at 0.25 per cent. there were 26.5 per cent. diseased pods. The imperceptibility of the perenox spray deposit, however, may result in some pods escaping treatment. In trials in the Cameroons in 1953 and 1954, with intervals between sprays of three and six weeks, respectively, applications of 1 per cent. carbide Bordeaux showed 2.5 and 9.1 per cent. black pods, the corresponding losses for the unsprayed controls being 30.6 and 66 per cent.

S. R. CHANT states that four weeks after planting, cacao seedlings developed a brown discoloration of the leaf tips, which spread along the leaf and was followed by wilting of the petioles and top of the stem, which also turned brown. Death usually followed. Humidity appeared to be an important factor in inducing the condition.

Concentric ring blotch of citrus [cf. 35, p. 283] at Moor Plantation and other nurseries has markedly declined, and no symptoms have been observed on plants over four years of age.

W. R. STANTON and R. H. CAMMACK summarize the work done by the maize rust [*Puccinia polysora*] research unit during the period under review [cf. 35, p. 383; 36, p. 523].

LITZENBERGER (S. C.) & STEVENSON (J. A.). **A preliminary list of Nicaraguan plant diseases.**—*Plant Dis. Repr.*, Suppl. 243, 19 pp., 1957.

This list of plant diseases is based mostly on observations made during the development of the co-operative agricultural research programme in Nicaragua since 1952. Pathogens are listed under hosts, both in alphabetical order, and the areas where they were observed are noted. The list includes *Alternaria porri* on onion; *Cercospora* [*Mycosphaerella*] *arachidicola* [map 166], *C. personata* [*M. berkeleyi*] [map 152], *Puccinia arachidis* [map 160], and *Sclerotium rolfsii* on groundnut; *S. rolfsii* on lucerne; *C. beticola* [map 96; cf. 30, p. 123] on beet; *A. brassicae* on Chinese cabbage and turnip; *C. capsici* [map 248] on *Capsicum frutescens*; *Colletotrichum lagenarium* [map 313] and *Pseudoperonospora cubensis* [map 285] on watermelon, melon, cucumber, and squash; *Mycosphaerella citrullina* [*M. melonis*] on watermelon; *Erysiphe cichoracearum* on squash; *Sphaceloma fawcettii* [*Elsinoe fawcetti*] [map 125] on orange; *Cercospora coffeicola* [map 59], *Omphalia flavida* [map 9], *Pellicularia* [*Corticium*] *koleroga* [map 64], and *Rosellinia bunodes* on coffee; *A. dauci* on carrot; *Cercospora canescens* on *Dolichos lablab*, cowpea, and soy-bean; *Leveillula taurica* [map 217] on *D. lablab*; *Claviceps tripsaci* on *Euchlaena mexicana*; *Cercospora kikuchii* and *Xanthomonas phaseoli* var. *sojensis* on soy-bean; *Fusarium vasinfectum*, *Ramularia areola* [map 260], *Verticillium albo-atrum*, and *X. malvacearum* [map 57] on cotton; *Dothidella ulei* [map 27] on rubber; *A. solani* [map 89] and

Phytophthora infestans [map 109] on both tomato and potato; *Uromyces striatus* [map 342] and *X. alfalfae* on lucerne; *C. stizobii* on *Mucuna deeringiana*; *C. musae* [*Mycosphaerella musicola*: map 7] on banana; *C. nicotianae* [map 172] on tobacco; *C. oryzae* [map 71], *Helminthosporium oryzae* [*Ophiobolus miyabeanus*: map 92; cf. 36, p. 354], *Piricularia oryzae* [map 51], *Ustilaginoides virens*, and *X. oryzae* [map 304] on rice; *C. purpurea* on avocado pear; *E. polygoni* on *Phaseolus aureus* and *P. vulgaris*, and *Fusarium oxysporum* f. *vasinfectum* [*F. vasinfectum*] on *P. aureus*; *Colletotrichum lindemuthianum* [map 177; cf. 30, p. 217], *Isariopsis griseola*, and *X. phaseoli* on *P. vulgaris*; *Cercospora ricinella* on *Ricinus communis*; *Colletotrichum falcatum* [*Glomerella tucumanensis*: map 186] on sugar-cane and Sudan grass; *F. moniliforme* [*Gibberella fujikuroi*] and *H. sacchari* on sugar-cane; *Alternaria* sp. and *Cercospora sesami* on sesame; *Streptomyces* [*Actinomyces*] *scabies* on potato; *Gloeocercospora sorghi* [map 339] on sorghum and Sudan grass, *Puccinia purpurea* [map 212] on sorghum, Sudan grass, and maize; *Sphacelotheca sorghi* [map 220] on sorghum; *H. turcicum* [map 257] on Sudan grass, broomcorn [*Sorghum bicolor* var. *technicum*], and maize; *Diplodia* [*Botryodiplodia*] *theobromae* on cacao; *P. polysora* [map 237] on *Tripsacum laxum* and maize; *Gibberella zeae* on wheat and maize; *H. sativum* [*Cochliobolus sativus*: map 322], *P. graminis*, and *P. recondita* on wheat; *Cercospora cruenta* on cowpea; and *Angiopsora zeae*, *H. maydis* [*Cochliobolus heterostrophus*], *P. sorghi* [map 279], and *Ustilago maydis* [map 93] on maize.

Virus diseases, which have not yet been identified, were noted on *Capsicum frutescens*, cassava, cotton, cowpea, cucurbits, maize, papaw, *Phaseolus vulgaris* and *P. aureus*, potato, tobacco, tomato, sorghum, soy-bean, and sugar-cane.

GUHA (A.). **A new technique for the viable count of bacteria.**—*Nature, Lond.*, 179, 4574, p. 1360, 1957.

In the absence of a reliable method for identifying viable cells in a mixture of live and dead bacteria when counting under the microscope the following technique was developed at the Biophysics Division, Institute of Nuclear Physics, Calcutta. Nutrient broth containing 1 gm. per 100 ml. 2,3,5-triphenyl tetrazolium chloride was inoculated with 1 ml. of a suspension containing a known number of bacteria and incubated for an hour at 37° C. The number of bacteria in the broth was then counted with a haemocytometer, using 4 per cent. formalin as a diluent. This treatment killed and fixed the bacteria, which were counted with an ordinary microscope. Living bacteria had a reddish tinge while the dead were quite transparent. The tetrazolium salt was not toxic to the bacteria and did not retard the growth rate.

RANGASWAMI (G.). **Development of resistance to streptomycin in *Xanthomonas citri* and *X. malvacearum*.**—*Curr. Sci.*, 26, 6, pp. 185–186, 1957.

At the Agricultural Research Institute, Division of Mycology and Plant Pathology, Coimbatore, India, resistance to streptomycin was developed in *Xanthomonas citri* from citrus and *X. malvacearum* from cotton [36, p. 310] by culturing in media containing progressively increasing concentrations of the antibiotic [cf. 36, p. 232]. Strains of the two species resistant, respectively, to 5,000 and 2,500 µgm. per ml. were obtained.

SRINIVASAN (M. C.) & PATEL (M. K.). **Two new phytopathogenic bacteria on verbenaceous hosts.**—*Curr. Sci.*, 26, 3, pp. 90–91, 1957.

Two new bacterial diseases are described from Panchgani, Bombay, India. *Xanthomonas durantae* n.sp. (cells 1·7 by 0·8 µ) on *Duranta repens*, a hedge plant, produces small, circular leaf spots with a light brown centre, becoming enlarged and angular with a raised margin. *X. lantanae* n.sp. (cells 1·5 by 0·7 µ) on *Lantana camara* var. *aculeata* causes angular, water-soaked spots, deep pink, often with a whitish or pale brown centre, heavy infection hastening defoliation. In

cross-inoculations the bacteria failed to infect other verbenaceous hosts, including *Clerodendron phlomoides* and *Tectona grandis* on which *Xanthomonas* spp. have already been recorded [34, p. 518].

THRESHOW (M.). Terminal bleach of cereals.—*Plant Dis. Repr.*, 41, 2, pp. 118–119, 2 figs., 1957.

In a survey of seven counties in Utah carried out by the United States Steel Corporation in 1956 terminal bleach of cereals (wheat, oats, and barley) was observed in approximately one-fourth of the fields studied. Necrosis or white 'bleaching' affects the tips of the flag leaf and of other young leaves, a rapid breakdown of chlorophyll in the affected areas leading to the condition within about 24 hours. High incidence is sometimes of economic importance.

Terminal bleach may be caused by desiccation of the leaves following on abrupt environmental change, as in 1953 and 1956 when a long, cool spring was suddenly ended by high temperatures and drying winds.

CHRISTENSEN (C. M.). Deterioration of stored grains by fungi.—*Bot. Rev.*, 23, 2, pp. 108–134, 1957.

The author reviews and discusses with 54 references to the literature the damage caused to grain in bulk storage by fungi [cf. 35, pp. 438, 818; 36, p. 186], the species involved, the methods of determining the number and kinds of fungi, where and in what form they occur within seeds, when they invade, the conditions influencing this invasion, the effects of storage moulds on seeds, and control.

PAHARIA (K. D.). The effect of cropping sequence on soil microflora in relation to development of root-rots of cereals.—*Diss. Abstr.*, 16, 12, pp. 2273–2274, 1956.

Studies at the University of Minnesota showed that root rots of wheat and maize were reduced when these crops followed oats, soybean, or flax. Dilution plate counts of micro-organisms demonstrated the increased populations of bacteria and also fungi of the genera *Alternaria*, *Cephalosporium*, *Fusarium*, *Helminthosporium*, *Rhizoctonia*, and *Verticillium* in the rhizosphere of susceptible cereals, whereas *Aspergillus*, *Chaetomium*, *Mucor*, *Penicillium*, *Rhizopus*, and *Trichoderma* prevailed in that of resistant crops.

Oat and soybean crops increased antagonistic species in the soil. *Helminthosporium sativum* [*Cochliobolus sativus*] and *Gibberella zeae* inoculated into soils previously planted with oats and soybean were more markedly inhibited than in soils previously planted with other cereals. This protective effect persisted for one season and was attributed to an increase in the activity of the microflora in general and of antagonists in particular. The microfloras of decomposing green crops differed quantitatively and qualitatively.

PARMENTIER (G.). Étude expérimentale sur la stabilité des races physiologiques d'Erysiphe graminis (D. C.). [An experimental study on the stability of the physiologic races of *Erysiphe graminis* (DC.).]—*Parasitica*, 13, 2, pp. 50–63, 1957.

Further studies at the State Phytopathological Station, Gembloux, Belgium, on physiologic races of *Erysiphe graminis* [36, p. 459] showed that the various strains of the fungus studied, both from barley and wheat, were distinct, hyper-specialized biological entities which behaved, in the experimental conditions, as physiologic races. In the tests used, their repeated transfer by means of conidia did not modify their specific virulence. The repeated passage of these physiologic races through more, or less, resistant host varieties did not permanently affect their range of infection. Temporary fluctuations were noted, but the more virulent the race, the less important they appeared to be.

STEWART (D. N.), COTTER (R. U.), ROBERTS (B. J.), & HAYDEN (E. B.). **Physiologic races of *Puccinia graminis* in the United States in 1955.**—*Plant Dis. Repr., Suppl.* 239, pp. 99–105, 1 graph, 1956.

Data on the prevalence and distribution of physiologic races of *Puccinia graminis* on wheat and oats in the United States in 1955 are presented in tabular form. On wheat, race 15B, though still the most prevalent, decreased from 63 per cent. of the isolates in 1953 to 47 per cent. in 1955, and the 17–29 group increased from 4 to 20 per cent. during the same period. Race 56, third in prevalence, decreased to 18 per cent., while race 48A increased from 4 per cent. in 1954 to 5 per cent. From barberry collections, 25 races and biotypes were isolated.

On oats, race 7, the most prevalent since 1950, constituted 68 per cent. of the isolates, as against 58 per cent. in 1954, while races 2 and 8 each contributed 12 per cent. Race 7A decreased since 1954 from 9 to 5 per cent. Race 6 was identified at Columbia, Missouri, the first time it had been found independently of barberry in the Upper Mississippi valley. A variant of race 5, designated 5A, was found on Saia oats adjacent to barberries at Blacksburg, Virginia, constituting the first record of a race in the United States pathogenic to Saia.

THORPE (H. C.) & DIXON (G. E.). **Release of new cereal varieties—1957.**—*E. Afr. agric. J.*, 22, 4, pp. 183–185, 1957.

The following are among the new cereal varieties released by the Department of Agriculture, Kenya, for sowing during the 1957–8 season [cf. 35, p. 7]. Wheat 363.K.1.B.3 has remained free from stem rust (*Puccinia graminis*) in high country, though attacked in Trans Nzoia. Both 362.B.1.A.1.B and 362.B.1.D.3.D wheats are resistant to yellow rust (*P. glumarum*) even at the highest altitudes and are suited to areas above 8,000 ft. Seedling tests indicated that Mida Cadet wheat (from Canada) is resistant to the earlier races of *P. graminis*; it was slightly attacked in the field, though not damaged. It is recommended for altitudes from 6,000 to 7,000 ft. As it is susceptible to *Septoria nodorum*, a dry year will probably suit it best. Capella wheat (from Italy) may be sown at 7,000 to 8,000 ft.; above this it is liable to damage from yellow rust. Owing to weak straw, it is apt to lodge on very rich land. Hopeful and Impala wheats should not be grown above 6,000 to 7,500 ft., because of yellow rust. Oat 3003.F was severely attacked by *P. graminis* at 7,000 ft., and should therefore be kept to the higher altitudes.

JOHNSON (T.). **The rusts of Wheat and Oats in Canada, 1956.**—*Robigo*, 1957, 3, pp. 3–5, 1957. [Spanish translation.]

Investigations by the Plant Pathology Laboratory, Winnipeg, showed that race 15B of wheat stem rust (*Puccinia graminis*) [36, p. 93] decreased sharply in Canada during 1956 (from 66 per cent. in 1955 to 40), while races 11 and 56 increased. In the case of wheat leaf rust (*P. triticina*) [loc. cit.] race 15 was predominant, followed by race 58. Race 5 constituted only 10.4 per cent. of the isolates, as against 30 per cent. in 1955. Selkirk wheat was resistant to both *P. graminis* and *P. triticina* but the presence of strains pathogenic to it in many races of *P. graminis* is becoming evident [35, p. 157], though these comprised only 9 per cent. of the isolates in 1956.

Race distribution in oat stem rust (*P. graminis*) [34, p. 432; 35, p. 816] differed little from that of 1955, race 7 constituting 61 per cent. of the isolates. With crown rust (*P. coronata*) of oats [loc. cit.] 36 races and sub-races were identified from 132 isolates, races 201, 202, 209, 212, 239, and 240, and their sub-races comprising 64 per cent. of the total. Seven races (251, 263, 274, 276, 279, 284, and 285) were identified for the first time in Canada and these, except for 251 and 284, can attack all commercial oat varieties now grown in Canada.

VALLEGA (J.). **Incorporación de factores de resistencia a las enfermedades en los Trigos cultivados.** [Incorporation of factors of resistance to diseases in cultivated Wheats.]—Reprinted from *Idia*, 100, pp. 1–6, 4 figs., 1956.

This is a semi-popular account of the problems facing wheat breeders in Argentina with special reference to incorporating resistance to *Puccinia graminis* [36, p. 92] and the work carried out in this field at the Instituto de Fitotecnia, Castelar.

HAYDEN (E. B.). **Progressive development of infection by *Puccinia graminis* var. *tritici* Eriks. and E. Henn. (Guyot) on certain varieties of Wheat and the relation of stem rust to yield.**—*Diss. Abstr.*, 16, 12, pp. 2262–2263, 1956.

In the four severe epidemics of wheat stem rust (*Puccinia graminis tritici*, race 15B [36, p. 461]) in the United States since 1950 the susceptible varieties Lee and Sentry (a durum variety) produced relatively high yields despite heavy infection at maturity, and are accordingly termed tolerant [35, p. 665].

In this study at the University of Minnesota susceptible wheat varieties (six in 1954, eight in 1955), differing in their ability to yield under stem rust attack, were exposed to natural epidemics of race 15B at five locations in Minnesota and North Carolina. Lee exhibited low initial infection, and a less severe attack of the basal 8 to 10 in. than Marquis and Mida, though at maturity the disease was only slightly less severe. On Sentry initial incidence was low, being less severe on the lower parts than on Carleton and Nugget. Fewer lesions developed from artificial inoculation on tolerant than on non-tolerant varieties, though with the durum varieties these differences were slight. Spread from experimentally established initial centres of infection in 1954 caused an infection severity of 30 to 50 per cent. in Lee in an area approximately 3 ft. in diameter; both severity and spread were greater in Marquis and Mida; in Sentry they were limited, and in Carlton and Nugget both were greater, especially in the latter. Variations in the amount of inoculum used in 1955 to establish infection centres had practically no effect on the results. The number of lesions on seedlings of all varieties increased as the time in a moist chamber was increased from six to 24 hrs., but there were fewer on all varieties at 78° to 82° F. than at 65° to 70°.

Under artificial inoculation in the field Lee and Sentry gave better yields than the other four varieties, but the differences grew less as the amount of inoculum increased. Yield was not quantitatively related to the severity of rust attack on the basal parts of the plants or on the peduncles of individual varieties but early infections of the basal parts reduced the yields of Lee, Mida, and Sentry more than late infections on peduncles.

SANTIAGO (J. C.). **Epidemiology of Wheat stem rust in Portugal and the effect of environmental factors and certain mutagenic agents on the prevalent physiologic races of *Puccinia graminis tritici*.**—*Diss. Abstr.*, 16, 12, p. 2274, 1956.

The races of *Puccinia graminis tritici* detected in wheat-growing areas in Portugal in 1951 were 14, 16, 21, 24, 34, 40, and 75, and one unidentified, being present in the following percentages, respectively: 15, 22.5, 27.2, 2.5, 7.5, 4, 12.5, and 2.5.

Epidemics occur suddenly and simultaneously throughout Portugal. All but two of 125 varieties and selections of Portuguese wheats examined in the greenhouse and field proved susceptible to the prevalent races. In some lines the reaction of seedling and mature plants appeared to be determined by different genes. When 37 lines were examined in the United States for seedling reaction to races 15B, 48B, 14, 21, and 34, only Lusitano proved resistant to 15B in all environments though five lines susceptible at high temperatures were resistant at low. Variability of reaction with temperature was also observed in lines from the World Collection of Wheats and in the differential series. On the latter, races 14 and 48B resembled races 17 and 32, respectively, at 85° F. Light was not so effective as temperature in causing

variations of reaction, but in tests with race 21 on four varieties blue and green light reduced the number of infections on Marquis, as compared with red and yellow light. Flecks, in addition to normal uredosori, appeared on Kota in blue light, and on Kota, Arnautka, and Spelmar in green light.

Colchicine, ultra-violet irradiation, and extreme temperatures (-10° or $+105^{\circ}$), whether applied to spores or to rusted wheat plants, produced no mutations in colour or pathogenicity of a clonal line of race 21.

BATTS (C. C. V.) & ELLIOTT (C. S.). **Effect of black rust on yield of Wheat in southern England in 1955.**—*Plant Path.*, 6, 2, pp. 45–46, 1957.

In spring wheat trials in southern England in 1955, yields in the south-west were greatly reduced by *Puccinia graminis*. The worst effect was in Devonshire, where in one trial the yields were: Atle, 8.8; Atson, 10.4; Karn II 9.2; Koga II, 2.4; Peko, 4.1; and Progress, 6.3 cwt. per acre. The figure for Koga II represents a loss of over 90 per cent. compared with its average yield when no rust was present. Fylgia suffered relatively little. In winter wheat trials, Eclipse and Heines VII appeared to be somewhat more susceptible than Cappelle Desprez, Hybrid 46, Minister, and Redman, and in two trials Pilot and King II were more severely affected than numerous other winter wheat varieties. The physiologic race (or races) of *P. graminis* concerned were not identified.

KIRÁLY (Z.) & FARKAS (G. L.). **Infektionsbedingte Änderung der Glutaminsäure-carboxylaseaktivität bei rostbefallenen Weizen.** [Infection-conditioned modification of glutaminic acid decarboxylase activity in rust-affected Wheat.]—*Naturwissenschaften*, 44, 12, p. 353, 1957.

At the Research Institute for Plant Protection, Budapest, the enzyme activity of greenhouse-raised Hungarian R 23 wheat seedlings artificially infected with uredospore suspensions of *Puccinia graminis* was manometrically studied [cf. *Canad. J. Bot.*, 30, p. 755, 1952] 12 to 14 days after infection, and found to be significantly reduced by rust.

KIRÁLY (Z.) & FARKAS (G. L.). **Decrease in glycolic acid oxidase activity of Wheat leaves infected with *Puccinia graminis* var. *tritici*.**—*Phytopathology*, 47, 5, pp. 277–278, 1957.

In further studies at the Research Institute for Plant Protection, Budapest, six-day-old wheat seedlings were inoculated with race 21 of *Puccinia graminis* [35, p. 757; cf. 36, p. 179]. A week to ten days later it was found that there had been a considerable rise in the respiratory rate of the susceptible varieties F481 and R23 and this was correlated with markedly decreased glycolic acid oxidase activity, whereas in the resistant wheats (*Triticum timopheevi*, Einkorn, and Vernal) the former was but slightly increased and the latter little affected. Accepting that the prosthetic group of glycolic acid oxidase is riboflavin phosphate, and since obligate parasitism has high vitamin requirements, it is tentatively suggested that the phenomena described may be accounted for if the pathogen uses the vitamin portion of the molecule, thus inducing a fall in enzyme activity.

ROHRINGER (R.). **Untersuchungen zur Biochemie von Weizenkeimpflanzen nach Infektion mit *Puccinia graminis tritici*, Erikss. und Henn. ph. R.126A.** [Studies on the biochemistry of Wheat seedlings after infection with *Puccinia graminis tritici* Erikss. & Henn. physiologic race 126A.]—*Phytopath. Z.*, 29, 1, pp. 45–64, 1957.

Some of the results of the author's studies on the changes in amino acid content induced by the inoculation of wheat seedlings with physiologic race 126A of *Puccinia graminis tritici* have already been noticed from another source [34, p. 291].

Of the 22 ninhydrin-positive free amino compounds occurring in the seedlings, 17 were identified as acids, the distribution of which was practically uniform in healthy material of the seven varieties under observation. Under the influence of infection, however, characteristic changes occurred in the relative proportions, particularly noticeable being the regular increase in glutamine. The amino acid composition of the leaf proteins did not appear to be influenced by the rust. The hydrolysates contained 16 amino acids.

SKOROPAD (W. P.) & ARNY (D. C.). **The influence of amino acids on the growth of two strains of *Helminthosporium gramineum*.**—*Phytopathology*, 47, 5, pp. 249–252, 1 graph, 1957.

In further joint studies by the Canada Department of Agriculture, Edmonton, Alberta, and the University of Wisconsin, Madison, on *Helminthosporium gramineum* the two strains C-1 and GHA2 [36, p. 18] were incubated for 14 days in Converse's liquid medium with sucrose substituted for glucose and containing 0.245 gm. per l. of nitrogen, half as ammonium nitrate and half as amino acid or amide [cf. 33, p. 343]. The 17 amino acids and amides used, which were those known to be present in six-day malt from Oderbrucker barley, caused marked differences in the growth of the two strains (as measured by dry weight of mycelium). That of GHA2 was augmented to a greater degree, the increase amounting to as much as 78 per cent. with glutamic acid; on the other hand, isoleucine and aspartic acid decreased its growth by 35 per cent.; isoleucine also reduced that of C-1 by 50 per cent. Leucine and glutamine increased the growth of GHA2 by 24 per cent. and decreased that of C-1 by 36; a combination of such oppositely acting compounds produced an intermediate result.

When all the amides and amino acids were combined in the proportions found in six-day malt, to give 0.245 gm. nitrogen per l., it was found that the inhibitory effect of leucine was neutralized by the presence of the others, and that of aspartic acid towards GHA2, but not to C-1. In the complete medium lacking leucine, growth of C-1 was significantly greater and of GHA2 significantly less than with leucine. There was no apparent relationship between the influence of the amino acids on growth when used singly and when in combination, but the amino acid nutrition of the fungus appears to be of potential importance in relation to its pathogenicity.

HRUSHOVETZ (S. B.). **Effect of amino acids on the virulence of *Helminthosporium sativum* to Wheat seedlings.**—*Phytopathology*, 47, 5, pp. 261–264, 2 figs., 1957.

In further studies on *Helminthosporium sativum* [*Cochliobolus sativus*: 35, p. 912] at the University of Alberta, Edmonton, Canada, an isolate of the fungus which had been cultured on potato-dextrose agar for several years was grown on Czapek's medium, to which each of a number of amino acids was added at 0.1 per cent. (w/v), and subcultured six times at two-week intervals. The fungus from each stage was incubated in sterilized soil in flasks for two weeks, and seeds of Red Bobs wheat were then sown in these, or in pots containing the contents of such flasks added to unsterile soil. After a further two weeks the pathogenicity of the fungus was ascertained by Greaney's rating [17, p. 668] and by a combined symptom rating. Any one of the amino acids alanine, arginine, histidine, isoleucine, leucine, methionine, serine, threonine, and tryptophane induced progressive attenuation of virulence though other amino acids tested did not. Prevalence of spores or mycelium proved unrelated to virulence. Similar behaviour has been noted with other organisms [cf. 20, p. 248].

As a possible explanation of the phenomenon in this instance it is postulated that while *C. sativus* grows on potato-dextrose agar the heterokaryons present are a mixture of wild type strains and others dependent on specific amino acids for

growth [cf. 32, p. 28]. Czapek's medium favours the wild types, but if supplemented by an amino acid, it favours the strains needing this acid for growth. The presence of specific amino acids in the tissues of the host will exert a similar influence [34, p. 143]. If the amino acid in the host favours the strain present in the inoculum, the fungus will grow, but may be relatively non-pathogenic; in its absence, the pathogenic component of the heterokaryon has the advantage.

ZOGG (H.). **Über die Beeinflussung von Pathogenität und Wachstum pflanzlicher Parasiten. II. Vitamine B₁ und biotin; Calonectria graminicola.** [On the factors influencing the pathogenicity and growth of plant parasites. II. Vitamin B₁ and biotin, *Calonectria graminicola*.]—*Phytopath. Z.*, 29, 1, pp. 65–71, 1 diag., 5 graphs, 1957. [English summary.]

The results of these studies have already been noticed [36, p. 640].

TUITE (J. F.) & CHRISTENSEN (C. M.). **Grain storage studies XXIII. Time of invasion of Wheat seed by various species of *Aspergillus* responsible for deterioration of stored grain, and source of inoculum of these fungi.**—*Phytopathology*, 47, 5, pp. 265–268, 1957.

In further studies at the University of Minnesota, St. Paul [cf. 35, p. 439], samples of wheat grain collected in many localities in the United States during 1953–55 were treated with 1 per cent. sodium hypochlorite for one min., rinsed, and cultured. Microscopic examination showed that very little invasion by *Aspergillus glaucus*, *A. candidus*, *A. flavus* [31, p. 112], and *Penicillium* spp. occurs in the field or while the seed remains in the heads, even if these are artificially inoculated in the field. Exposure of Petri dishes also showed very small amounts of inoculum of such fungi to be present above wheat fields. Threshed seed, however, becomes much more subject to invasion than seed in heads. Inoculum in the air becomes increasingly present in country elevators and more so in terminal elevators, and the invasion of seed increases between harvest and final storage.

WAGNER (F.). **Warum tritt der Zwergbrand des Weizens nur im südlichen Bayern auf?** [Why does dwarf bunt of Wheat occur only in southern Bavaria?]
—*Prakt. Bl. PflBau*, 51, 1, pp. 28–32, 1 map, 1956.

Spores of dwarf bunt [*Tilletia controversa*], which remain viable in the soil for a number of years, germinate in autumn when seed bed preparation brings them to the surface where they are exposed to the light [36, p. 236]. Winter wheat is grown to a much greater extent in southern than in northern Bavaria (occupying over 25 per cent. of cultivated land in many parts of the south, but under 19 per cent. in the north), and in the south it often happens that fields are planted to winter wheat with less than two years between successive crops. The possibility thus offered for a build-up of inoculum is much greater in the south, and it is here that the disease makes its appearance [cf. 35, p. 436].

WELTZIEN (H. C.). **Untersuchungen über den Befall von Winterweizen durch *Tilletia tritici* (Bjerk.) Winter unter besonderer Berücksichtigung der Frage der Beizmittelresistenz.** [Studies on the infection of winter Wheat by *Tilletia tritici* (Bjerk.) Winter with special reference to the question of resistance to seed dressings.]—*Phytopath. Z.*, 29, 2, pp. 121–150, 1 fig., 1 diag., 2 graphs, 1957.

The two aspects of the problem indicated in the title considered in the author's studies at the Institute for Phytopathology, University of Bonn, Germany, were (1) inefficiency of seed dressings in contaminated soil [26, p. 11; 31, p. 484; 33, p. 530], and (2) the development of strains of *Tilletia tritici* [*T. caries*] with enhanced resistance to fungicides [34, p. 221].

Normal bunt spores and balls disintegrated rapidly in tests in damp garden soil [cf. 13, p. 430]. Loose spores lost their pathogenicity in about a month, while those enclosed in balls were no longer viable after eight to ten weeks. The average incidence of infection in Carstens V plants treated with tritisan at dosages of 100, 200, and 300 gm. per doppelzentner [100 kg.] was only 0.75 per cent. as compared with 66.3 and 63.2 per cent., respectively, for fusariol and ceresan at the same rates. Under-dosage with the two latter resulted in heavier infection (75.2 and 63 at 100 and 200 gm., respectively) than was found in the controls (60.2), while the percentage developing in the lot treated at the rate of 300 gm. was 55.9.

The constant differences observed in the relative germinability of 20 lots of spores from various parts of the country after treatment with ceresan at 1 gm. per kg. are considered to be attributable exclusively to disparities in their resistance to seed dressings. In the field the marked differences in the pathogenicity of 22 lots of diverse origin to untreated seed resulted in part from the influence of the preceding year's host [cf. 11, p. 565], Carstens V, for instance, inducing a high degree of virulence. Similar trends were observed in the tests on seed treated with ceresan and tritisan at 0.5, 1, and 2 gm. per kg. Here again the uniform superiority of the latter chemical was clearly demonstrated.

MICZYŃSKI (K.). **Wrażliwość odmian Pszenicy jarej na śnieć cuchnącą (*Tilletia caries* Tul.) przy sztucznym zakażeniu.** [The susceptibility of spring Wheat varieties to bunt (*Tilletia caries* Tul.) with artificial inoculations.]—*Acta agrobot.*, 5, pp. 139–145, 1956. [English summary.]

During 1949–52 and in 1954 at Cracow, Poland, 57 varieties of spring wheat, including the 33 cultivated in the country, were tested by inoculation for resistance to bunt (*Tilletia caries*). None of the varieties of *Triticum vulgare* or *T. durum* was resistant but all the pedigree lines of *T. timopheevi* (var. *typicum* 1 to 5) [cf. 34, p. 443] and *T. persicum* vars. *rubiginosum* and *stramineum* remained disease-free. This is of interest from the breeding point of view as the *T. persicum* varieties are readily crossed with common wheat, the hybrids being partially or fully fertile.

MISHRA (J. N.). **Resistance of Bihar Barley to covered smut, *Ustilago hordei* (Pers.) Lagerh.**—*Proc. Bihar Acad. agric. Sci.*, 4, pp. 150–151, 1955. [Received 1957.]

In preliminary trials at the Bihar Agricultural Research Institute, Sabour, Bhagalpur, India, during 1954–5 the barley variety B.R. 22 was less susceptible to *Ustilago hordei* [33, p. 291] than three other recommended varieties.

MOULE (C.). **La résistance des variétés d'Avoine a la rouille couronnée.** [The resistance of varieties of Oats to crown rust.]—*Ann. Amélior. Plantes*, 5, pp. 639–662, 1955. [Abs. in *Zbl. Bakt.*, Abt. 2, 110, 16–20, p. 597, 1957.]

None of the French varieties of oats used in breeding experiments at Versailles proved resistant to crown rust [*Puccinia coronata*]. However, a high degree of resistance to the local physiologic race was shown by about 20 American varieties, some of which were also immune in the seedling stage from seven other races. In the first place two were chosen as progenitors, viz., Bonham, with the Bond type of resistance, and Garry, a descendant of Victoria. Both are also resistant to loose smut [*Ustilago avenae*] and the local race of black rust [*P. graminis*].

HUFFMAN (MARION D.). **The Septoria disease of Oats.**—Abs. in *Iowa St. Coll. J. Sci.*, 31, 3, pp. 447–448, 1957.

No positive evidence of seedling infection of oats by *Leptosphaeria avenaria* [cf. 36, p. 464] was obtained at Ames, Iowa. The fungus appeared to overwinter as mycelium in the stubble, forming fruit bodies in the spring. Abundant spores for subculturing and inoculation were obtained on oat leaf agar. Germination was

best after at least 12 hours' exposure to free water, but about 5 per cent. of the total germination occurred after four hours at 93.5 per cent. relative humidity. No oat selection from the Cereal Investigations Collection of the United States Department of Agriculture was immune from the disease, but 24 out of 4,751 tested were more resistant than any present commercial variety in the north central United States [cf. 36, p. 19].

TURNER (ELIZABETH M.). **The effect of some amino acids on the growth of two varieties of *Ophiobolus graminis*.**—*J. gen. Microbiol.*, 16, 3, pp. 531–533, 1957.

In a study of the amino acid requirements of *Ophiobolus graminis*, the type variety and var. *avenae*, at the Department of Botany, Oxford University, growth with aspartic acid was equal to or almost as good as with hydrolysed casein. Growth was strongly inhibited by lysine and threonine. *O. graminis* var. *avenae* was inhibited by cystine and cysteine but the type variety of *O. graminis* made good growth with both, indicating a difference in their metabolism, and possibly correlated with their differing pathogenicity.

JAMALAINEN (E. A.) & YLIMÄKI (A.). **The control of snow mould in winter Rye by treatment of stands with chemicals.**—*Valt. Maatalousk. Julk.* 148, pp. 50–61, 1 fig., 1956. [Finnish summary.]

'Secondary' snow mould [*Calonectria nivalis*] infection of winter rye, resulting from invasion of the seed by conidia between the periods of flowering and yellow maturity, which according to Ekstrand [34, p. 634] is not amenable to seed treatment, was effectively combated in Finland during 1954–5 by dusting the seedlings in late autumn with 20 per cent. PCNB (botrillex or brassicol) [36, p. 7] at a dosage of 20 kg. per ha. Verdasan solution (containing PMA) at a strength of 2.5 per cent. also gave satisfactory results.

ZUBER (M. S.), GROGAN (C. O.), MICHAELSON (M. E.), GEHRKE (C. W.), & MONGE (J. F.). **Studies of the interrelation of field stalk lodging, two stalk rotting fungi, and chemical composition of Corn.**—*Agron. J.*, 49, 6, pp. 328–331, 1957.

At the Missouri Agricultural Experiment Station, Columbia, three maize inbreds, Ky 27, Mo 940, and L 317, susceptible to stalk lodging, and three, T 8, WF 9, and Mo 22, resistant to it were inoculated by the toothpick method with *Diplodia zeae* [36, p. 184] or *Gibberella zeae* [loc. cit.] ten days after 50 per cent. of the plants in a plot had silked. The tests were carried out in 1952 in two localities.

Lodging was not associated with high incidence of *D. zeae* or *G. zeae*, but was positively correlated with ash and cellulose content. Both stalk rots were positively correlated with the nitrogen content of the plants and negatively with crude fibre and cellulose, *D. zeae* being also negatively correlated with ash and lignin. High lodging was associated with high potassium and silicon and possibly with low magnesium, while the reverse was true of low lodging and low ash. In some crosses hardness of the epidermis and other morphological features appeared to be important.

AMICI (A[DRIANA]). **Su due specie di *Helminthosporium* che attaccano il Mais in Italia.** [On two species of *Helminthosporium* which attack Maize in Italy.]—*Maydica*, 2, pp. 25–36, 1 pl., 3 figs., 6 graphs, 1957. [German and English summaries.]

In October, 1955, the author isolated from a maize plant growing in the vicinity of Vercelli *Helminthosporium turcicum* and *H. maydis* [*Cochliobolus heterostrophus*: cf. 32, p. 183], the latter not previously recorded in Italy. Inoculations of maize seedlings of the Marano variety growing in a glasshouse with *C. heterostrophus* readily gave positive results, the strain apparently being highly virulent. Experimental evidence indicated that it produced a toxin or toxins.

PODHRADSKY (J.). **Die Krankheiten des Maises in Ungarn und ihre Bekämpfung.**

[The diseases of Maize in Hungary and their control.]—*Acta agron. Acad. Sci. Hung.*, 6, 1–2, pp. 143–147, 1956. [Russian and English summaries.]

Until the last few years maize smut (*Ustilago maydis-zeae*) [*U. maydis*] was the only serious pathogen of the crop in Hungary [17, p. 237], where it causes considerably heavier losses than the commonly accepted estimate of 0.5–1 per cent. Latterly, however, *Nigrospora oryzae* has been responsible for very severe damage to the flint and dent hybrids used in the breeding programme, both of which are reported to be resistant in other countries. Seed treatment with germisan at the rate of 200 gm. per doppelzentner [100 kg.] resulted in a marked improvement in germination (up to 96 per cent. (average 70.3), as compared with 51.3 in the control plots), but since some dent varieties are very sensitive to mercury, experiments are in progress with non-mercurial organic compounds. Dusting with germisan also destroys *Penicillium*, *Botrytis*, *Fusarium*, and other mould contaminants of the seed surface.

It is stated in a footnote that the cool, wet weather of 1955 promoted unexpectedly extensive damage by *Helminthosporium turcicum* [cf. 25, p. 492] and *F. moniliforme* [*Gibberella fujikuroi*].

Shell bark and collar rot of Lemons.—*Agric. Gaz. N.S.W.*, 67, 10, pp. 522–525, 4 figs., 1956.

A description is given of the two principal diseases of lemons in coastal New South Wales: collar rot (*Phytophthora citrophthora*) [34, p. 707] and shell bark, the latter believed due to a virus [35, p. 365], but with which climate, cropping, and nutrition are also involved. Under humid conditions the dead bark of the second disease becomes infected by *Diaporthe citri* [36, p. 525], which in a weak tree may become parasitic on the adjacent tissues.

SCHNEIDER (H.). **Chronic decline, a tristeza-like bud-union disorder of Orange trees.**—*Phytopathology*, 47, 5, pp. 279–284, 13 figs., 1 graph, 1957.

A chronic decline of unknown cause on sweet orange on sour orange root stock in California is described and figured in detail from the Riverside Citrus Experiment Station, California. First observed in 1947 in Ventura and San Bernadino counties, where the occurrence of tristeza virus was not then known, the disease has subsequently been studied in Valencia orange on sour orange stock. Acutely affected trees, with yellow foliage, partly defoliated, and bearing small crops, may be unilaterally affected, and occur at random in orchards. Necrosis of the sieve tubes below the bud union may produce girdling and is accompanied by anatomical abnormalities that distinguish the disease from that caused by tristeza virus, with the anatomical symptoms of which these are compared [33, p. 671]. There is excessive production of fibres (in sheets) and calcium oxalate crystals, and directly below the bud union the fusiform rays may be much elongated vertically, with a tendency to become hyperplastic and woody. Protuberances may develop on the cambial face of the bark immediately below the bud union, with abnormal amounts of ray tissue. Bark thickening occurs extensively below the union. The amounts of functioning phloem and of starch in the roots were positively correlated.

GRANT (T. J.) & HIGGINS (R. P.). **Occurrence of mixtures of tristeza virus strains in Citrus.**—*Phytopathology*, 47, 5, pp. 272–276, 1957.

At Orlando, Florida, four strains of tristeza virus [cf. 36, pp. 22, 317] (a very mild, two mild, and a severe strain) obtained from Key lime plants were compared. Inoculation of the Key lime seedling test plants was by leaf pieces [26, p. 298]. Branch growth was reduced in length in nine months by 2, 30, and 74 per cent. by the strains in increasing order of severity. The extent of pitting produced varied, both with inoculations from the same source and between the initial and subsequent

effects on the same plant. It appeared possible that the mild strains might in fact be a mixture. Symptoms in both leaves and stems were less marked in the greenhouse in summer than in winter.

Inoculation of Kalpi lime with mild strains produced marked differences in intensity of symptoms, and repeated transfers from plants with more and less intense symptoms, respectively, eventually yielded strains either markedly more virulent or much milder than the original. This result may have been influenced by the method of selecting leaf pieces for inoculum, but it indicates that dominance of a strain or strains is influenced by the physiology of the host plant.

The amount of pitting resulting from similar selections of the very mild and mild viruses, with progressive selection in the subsequent transfers of material much or little pitted, indicated that these mild strains either mutate easily or exist as a complex of strains capable of producing different amounts of pitting and also existing at varying levels in infected plants.

Cross protection tests on Key limes gave varying results. Simultaneous inoculation with mild and severe strains resulted in the severe symptoms appearing during the first six months; following inoculation with the severe strain four months after the others it was evident in six months that there was very little or slight protection with the mild strain but considerable protection with the very mild. In another similar experiment little protection was evident, but the severe strain appeared to become unevenly distributed in the plants.

The conflicting results obtained may be due to the failure of any one strain to become completely systemic, as has been observed with cucumber mosaic virus [36, p. 298]. There was no indication of a seedling yellows component [34, p. 640] and the relation of the stem pitting caused by tristeza virus on Key limes in Florida to that occurring on grapefruit in other countries remains to be determined.

PICHEL (R. J.). **Quelques aspects de la culture du Palmier à huile et du Cocotier en A.O.F. Conférence franco-britannique sur le Palmier Elaeis et le Cocotier à Cotonou et Abidjan — Janvier 1956.** [Some aspects of the cultivation of the Oil-Palm and the Coco-nut Palm in French West Africa. A Franco-British Conference on the *Elaeis* Palm and the Coco-nut Palm at Cotonou and Abidjan—January, 1956.]—96 pp., 19 figs., 3 diags., 2 graphs, 1 map, Bruxelles, Publication des Services de l'Agriculture du Ministère des Colonies et du Gouvernement général du Congo belge, 1957. [Flemish summary.] Fr. 20.

In the section (pp. 70–71) dealing with oil-palm blast, associated with *Rhizoctonia lamellifera* and an unidentified oomycete forming pseudo-mycorrhiza [cf. 36, p. 468], it is stated that leaf symptoms appear as a rule only when about 60 per cent. of the roots have been destroyed. The date of appearance of the symptoms bears no relation to that of transplanting, but is associated with changes in soil humidity or temperature at the end of the rainy season.

On p. 74 it is stated that coco-nut bronze leaf wilt [cf. 35, p. 448], known in French Togoland for the past 25 years, has recently become very severe there, the number of trees killed in the vicinity of Lomé being estimated at 50,000.

SCHARPENSEEL (H. W.), BIGORNIA (A. E.), & BALCE (S.). **Investigation on the etiology of the so-called cadang-cadang disease of Coconut trees.—Araneta J. Agric., 2, 3, pp. 15–27, 1955.**

The cadang-cadang disease of coco-nuts is stated to have spread widely and become increasingly virulent in the Philippines [34, p. 92] during the last decade. Between five and six million trees have already been destroyed. Two serious aspects of the problem are the irreversibility of the symptoms and the lack of knowledge concerning the etiology. The virus hypothesis is not borne out by the failure of mechanical transmission tests (though the possibility of the later develop-

ment of symptoms is not excluded). In studies on mineral uptake the upper leaves of infected trees were observed to absorb large quantities of radio zinc immediately after its application to the soil round the base, and at the end of a fortnight the element was already distributed throughout the tissues. Between the fifth and ninth week, however, there was a heavy drop in the absorption rate. In healthy trees, on the other hand, the rate of uptake was practically uniform throughout the trial period.

OCFEMIA (G. O.) & BUSTRILLOS (A. D.). **Electron microscopy of the unpurified extracts of Coconut infected with the cadang-cadang disease.**—*Philipp. Agric.*, 40, 10, pp. 553–558, 2 pl., 1957.

Electron-microscopic examination at the Central Experiment Station, Laguna, Philippines, of opened and unopened leaves, hearts, and unopened spathes of coco-nuts affected by cadang-cadang disease [see above] revealed numerous uniform, particulate, nearly spherical bodies in the sap from the opened leaves, and particularly in that from the hearts, which were not present in sap from healthy palms. (Small, dense particulate bodies were occasionally observed in the latter, but these were irregular in shape and size.) This is regarded as additional indication of the virus nature of cadang-cadang disease.

DROUILLON (R.). **Quelques considérations sur les traitements effectués à l'aide des pulvérisateurs pneumatiques à grande portée dans les plantations des Caféiers.** [Some considerations on treatments carried out with pneumatic long-range spraying-machines in Coffee plantations.]—*Agron. trop.*, Nogent, 12, 3, pp. 333–344, 26 figs., 2 graphs, 1957.

After describing two pneumatic long-range spraying machines, Swissatom 2000 and the Hardie Aero Mist Shade-Tree Sprayer, the author gives an account of comparative tests carried out with them (mainly against insect parasites of coffee) in the Ubangui-Chari, French Equatorial Africa, with special reference to the nature of the mist emitted. It is concluded that only those machines giving a large majority of drops 80 to 200 μ in diameter are suitable for coffee plantations. Emission should be at the rate of at least 10 l. per min. Atomization by several jets is preferable to that by one or two jets or a central cone, as jets of different diameters can be used, and the proportion of drops of various diameters regulated. The application of fungicides by this type of machine can be satisfactory only if the rate of spray output is increased by about one-half, since the effective range with a fungicide is about 30 per cent. less than that of an insecticide, and almost continuous coverage of the foliage is necessary.

BARRIGA (R.). **Ensayo comparativo de fungicidas para control de la gotera del Café, *Mycena citricolor* (Berk. & Curt.) Sacc.** [Comparative fungicide test for control of Coffee drop, *Mycena citricolor* (Berk. & Curt.) Sacc.]—*Agricultura trop.*, 13, 3, pp. 191–196, 1 fig., 1957.

In fungicide trials at the National Coffee Research Centre, Chinchiná, Colombia, for control of drop or cock's eye of coffee (*Mycena citricolor*) [cf. 36, p. 319], trees treated with Bordeaux mixture 2–2–40 or perenox showed a disease index of 13·4 and 14·8, respectively, after six months, as against 112·1 for the untreated control. Defoliation figures after six months were 10·6 per cent., 7·4 per cent., and 28·2 per cent., respectively.

SADASIVAN (T. S.) & SARASWATHI-DEVI (L.). **Vivotoxin and uptake of ions by plants.**—*Curr. Sci.*, 26, 3, pp. 74–75, 1 graph, 1957.

At the University Botany Laboratory, Madras, a disturbance in ionic uptake was observed in cotton plants grown in soil inoculated with *Fusarium vasinfectum* [36,

p. 469]. In a resistant variety the presence of the fungus caused only a slight reduction in the uptake of potassium, calcium, and magnesium and practically no change in their ratios, manganese content remaining unaltered. In the susceptible variety (K2) the imbalance in uptake and accumulation of these elements was considerable despite the apparently healthy condition of some of the plants. There was a considerable rise in the amounts of magnesium and manganese in susceptible, apparently healthy plants and in those with wilt the manganese level was higher than in the uninoculated controls. A marked reduction in potassium occurred in all the susceptible plants.

It is suggested that the strongly indicated loss in semi-permeability of the cells of apparently healthy susceptible plants may be due to the action of vivotoxins [35, p. 386], but that the amount of toxin, for unknown reasons, is insufficient to produce visual symptoms.

Genetics and cytology of Cotton 1948–1955.—*Bull. sth. co-op. Ser. U.S. Dep. Agric.* 47, 67 pp., 21 figs., 2 diags., 1 graph [? 1957].

This bulletin summarizes the principal accomplishments of the regional programme of cotton genetics research carried out from 1948 to 1955 under Southern Regional Project S-1. On p. 43 it is stated that resistance to *Fusarium* wilt [*F. vasinfectum*: 34, p. 226] appeared to be controlled by a single major gene and various modifiers in a cross of susceptible Half and Half with highly resistant Delfos 425 [loc. cit.]. Intercrossing of three pure breeding lines resistant to bacterial blight [*Xanthomonas malvacearum*: 36, pp. 185, 244] showed that resistance was conditioned in all three cases by the same genic combination. Outcrossing to susceptible stocks showed one major gene to be involved, with susceptibility dominant.

MICZYŃSKA (SOFIA). **Bakterioza Bawełny spowodowana przez *Pseudomonas malvacearum* Sm.** [Bacteriosis of Cotton caused by *Pseudomonas malvacearum* Sm.]—*Acta agrobot.*, 5, pp. 169–173, 1956.

The occurrence of cotton bacteriosis [blackarm] (*Xanthomonas malvacearum*) [map 57] in Poland in 1951 and 1952 is reported. Recommended control measures include the cultivation of resistant varieties, removal and destruction of diseased plants by burying 70 cm. deep in the soil, application of suitable fertilizers, use of healthy sowing material, crop rotation, and seed treatment with 4 per cent. formalin.

WICKENS (G. M.). **Treatment of Cotton seed against bacterial blight (*Xanthomonas malvacearum* (E. F. Smith) Dowson).**—*Emp. Cott. Gr. Rev.*, 34, 3, pp. 170–176, 1957.

In view of the extension of the practice of cotton seed treatment against *Xanthomonas malvacearum* in Africa, and the accumulation of data on the degree of effectiveness of cuprous oxide seed dressing in Uganda [cf. 32, p. 377; 36, p. 244], the author discusses the whole question of seed treatment against this disease. The evidence clearly shows that while copper oxide seed dressing has materially reduced primary infection in Uganda, considerable secondary infection can still develop.

Use of mercurials, though more effective than copper compounds, especially with regard to internal seed infection, requires adequate supervision to avoid the dangers inherent in their use. Means of achieving improved contact between the bactericide and external contamination of seed coat and fuzz are under investigation and use of wet treatment and slurries as opposed to dry treatment shows promise [36, p. 244]. Further study of the survival of *X. malvacearum*, particularly in the soil, to throw more light on secondary infection and the extent to which it may invalidate seed treatment, is required.

Since the author's earlier review [33, p. 229], evidence has accumulated that

the pathogen is much more variable than was formerly considered and that host resistance can collapse with the appearance of a new race. The continuance of seed treatment is, however, advocated, in conjunction with the development of highly resistant varieties.

REYNOLDS (H. W.) & HANSON (R. G.). **Rhizoctonia disease of Cotton in presence or absence of the Cotton root-knot nematode in Arizona.**—*Phytopathology*, 47, 5, pp. 256–261, 2 figs., 3 graphs, 1957.

Investigations at Sacaton, Arizona, from 1952 to 1954 showed that nematode damage and mechanical injury to cotton seedlings increased their liability to infection by *Rhizoctonia* [*Corticium*] *solani*. In pot experiments, using 30 gm. of *Corticium* culture in suspension in 3,000 ml. of water per pot as inoculum, or 2,000 viable larvae of *Meloidogyne incognita acrita*, or both, in steamed virgin soil, 64.7 per cent. of the Acala 44 cotton plants were infected after five weeks when both were present, compared with 48.2 for *C. solani* alone, 35.8 for nematodes alone, and 31.5 in the uninoculated.

In field tests fumigation with bromofume (3 gal. per acre) or dowsfume W-40 (10 gal.) markedly reduced the extent of root knot and therewith the amount of *C. solani* damage. Early invasion of seedlings by the nematode weakens the plants and increases loss by the fungus.

Artificial weakening of cotton seedlings mechanically by removal of portions of the cotyledons also increased the incidence of *Corticium* damage.

BROWN (LILY R.) & GONZALES (J. E.). **Cercosporiosis en el Algodonero.** [Cercosporiosis in the Cotton field.]—*Bol. Exp. agropec.*, Lima, 5, 3, pp. 7–10, 1956.

A severe leaf fall of cotton plants observed in the Valley of Barranca, near Lima, Peru, in 1956, was found to be due to *Cercospora gossypina* [cf. 26, p. 333]. Control by copper fungicides is recommended.

HARLAND (S. C.). **Breeding for Verticillium resistance in Peruvian Cotton.**—*Emp. Cott. Gr. Rev.*, 34, 3, pp. 161–169, 1957.

An account is given of detailed observations made in 1945–47 at Callao Experimental Station, Peru, on the genetical aspects of the wilt of cotton caused by *Verticillium albo-atrum* [cf. 35, p. 523], resulting in the isolation of the notably resistant variety SNA 249. The progress made from 1945 to 1952 is summarized. Tests of 144 progenies of various types of *Gossypium barbadense* (Algodon del Pais, Egyptian, Tanguis Plateado) and Upland brought to light promising material: Yauca 119—Algodon del Pais; Plateado 236—a type of Tanguis; and Egyptian Pima and Karnak. Tests of commercial varieties confirmed that the last two are more resistant than current Tanguis.

CHATTERJEE (R.), SRINIVASAN (K. S.), & MAITI (P. C.). **Cordyceps sinensis (Berkeley) Saccardo : structure of cordycepic acid.**—*J. Amer. pharm. Ass.*, Sci. Ed., 46, 2, pp. 114–118, 3 figs., 1957.

The morphological characters of *Cordyceps sinensis* (a celebrated drug in the Chinese Pharmacopeia), are described in this joint contribution (from the Medical College, Indian Museum, and University of Calcutta) from material obtained locally from a Chinese dealer and from Tibet [11, p. 372]. The fungus yields cordycepic acid, $C_7O_{12}H_8$, the structure of which was determined as 1,3,4,5-tetrahydroxycyclohexanoic acid, an isomer of quinic acid.

GANAROS (A. E.). **Marine fungus infecting eggs and embryos of Urosalpinx cinerea.**—*Science*, 125, 3259, p. 1194, 1 fig., 1957.

At the United States Fish and Wildlife Service, Milford, Connecticut, a fungus

attacked the ova within the egg-cases of the common oyster drill (*Urosalpinx cinerea*), one of the most destructive predators of young oysters, in outdoor tidal tanks, in which the molluscs are kept for laboratory study. A pure culture of the fungus was sent to England, where it infected the eggs of the oyster crab, *Pinnotheres*, and though it resembles *Plectospira dubia* (*J. Mar. biol. Ass. U.K.*, 33, pp. 721-731, 1954) it was not considered to be the same.

In preliminary experiments a culture of the fungus infected ova within the egg-cases of *U. cinerea* in sterilized sea-water at 20° C. and with a salinity of 21 parts per 1,000. In one experiment 100 per cent. infection occurred within 24 days, though the controls had none. When infected egg-cases were used as inoculum, only those that contained ova with larvae up to the veliger stage were infected.

COLHOUN (J.). Effects of nutrient treatments on stem-break of Flax (caused by *Polyspora lini* Laff.).—*Ann. appl. Biol.*, 45, 2, pp. 268-275, 1957.

In pot experiments during 1954-5 at Queen's University, Belfast, to study the effects of host nutrition on the incidence of infection of flax by *Polyspora lini* [36, p. 452], the plants were grown in prepared composts containing different levels and ratios of nitrogen, phosphorus, and potassium. When the cotyledons were inoculated, incidence of the seedling phase was unaffected by nutrient treatment, all plants becoming infected. The lowest incidence of the stem-break phase occurred, however, in composts deficient in compost, and increasing doses of the phosphatic fertilizer were associated with increases in susceptibility, as well as in plant height and yield of fibre. In one experiment, the incidence of stem-break was directly and very significantly correlated with the percentage of phosphorus in the plants when nitrogen and potassium were kept constant [cf. loc. cit.]. There was no evidence that susceptibility was affected by the percentage of nitrogen or potassium which the plants contained.

PULSIFER (H. G.). Anthracnose of Kenaf caused by *Colletotrichum hibisci* Poll.—*Abs. in Iowa St. Coll. J. Sci.*, 31, 3, pp. 504-506, 1957.

In studies at the Agricultural Experiment Station, Ames, Iowa, in 1952, on anthracnose of kenaf (*Hibiscus cannabinus*) caused by *Colletotrichum hibisci* [35, p. 454], the most obvious field symptoms, namely death of the apical portion of the plant and typical stem lesions, were found to be masked by continued growth under certain climatic conditions and followed by stunting and malformation.

Confirmation that *C. hibisci* is seed-borne was obtained by greenhouse planting in steamed soil of kenaf seed from infected plants.

In a mixed population of 3,657 purple, red, and green kenaf plants growing under conditions of natural infection in the field none of the purple showed stem lesions or tip blight, while 22.5 per cent. of the red and 35.8 of the green showed one or both of these symptoms. Greenhouse inoculation with spore suspensions affected only 40 per cent. of the purple variety as opposed to 80 of the green, but with wounding little or no difference in susceptibility was apparent.

C. hibisci was isolated from 33 of 62 seeds of okra (*H. esculentus*) which had overwintered in artificially infected capsules in the field.

Although attempts to infect kenaf seedlings through the seed with *Glomerella gossypii* were unsuccessful, young plants were infected after four successive passages of the pathogen through [mature] kenaf hosts, the two isolates of *G. gossypii* producing symptoms indistinguishable from those of *C. hibisci*. After growing on comparable media for five days, the conidia of *C. hibisci* averaged 10 to 11 μ in length as against 14 to 15 μ for those of *G. gossypii*. At 32° C. *G. gossypii* grew nearly as well as at 25°, while *C. hibisci* showed limited growth at the former temperature.

DIEKMAHNS (E. C.). **A boron deficiency in Sisal (*Agave sisalana* Perrine).**—*E. Afr. agric. J.*, 22, 4, pp. 197–198, 2 figs., 1957.

At the Sisal Research Station, Mlingano, Tanganyika, a new leaf symptom was observed on well-developed sisal plants (with at least 25 leaves) grown in sand and water cultures lacking in boron. A yellow speckle on both surfaces of the leaf, generally on the distal half, was followed almost at once by a superficial cracking of the epidermis. This usually began as a single crack at the margin and later branched across the lamina. Irregular, sunken areas formed and sometimes suberization occurred. The cracking was always most severe on the last leaf to unfurl, and occasionally on spike leaves the distal end appeared to have been severed a few mm. from the tip. Other symptoms included poor roots, an insignificant tip thorn, and a tendency for the tip of the leaf to be hooded. The growing-point and meristem became disorganized, and the new leaves were short and did not unfurl readily, this adding to the bulbous appearance of small plants. When boric acid was added to the nutrient at the rate of 0.66 p.p.m. the plants rapidly recovered and the new leaves were normal. Similar symptoms have occurred on sisal grown on red earth derived from gneiss in the Korogme area of Tanganyika, and on volcanic soils in the Northern Province.

ROBERTS (E. T.). ***Glomerella cingulata* causing a die-back of Privet.**—*Plant Path.*, 6, 2, p. 76, 1957.

In September, 1956, a privet hedge in Berkshire, at the base of which clippings from an adjoining apple orchard had accumulated for years, developed a die-back of the young shoots caused by *Glomerella cingulata*. This appears to be the first record of the fungus on privet in England since Brooks' [32, p. 391] report.

OSTERWALDER (A.). ***Olpidium* in Wurzeln von *Erica gracilis* Salisb.** [*Olpidium* in roots of *Erica gracilis* Salisb.]—*Z. PflKrankh.*, 64, 6, pp. 328–331, 1 fig., 1957. [English summary.]

The species of *Olpidium* recently reported as causing damage to the roots and sometimes death of *Erica gracilis* plants in Switzerland [35, p. 813] has been identified by a study of its morphological characters as *O. brassicae* [18, p. 821; 32, p. 438]. Further confirmation of identity was afforded by the positive results of inoculation experiments with the isolate from *E. gracilis* on cabbage. The root rot is controllable by the use of steam-sterilized soil, pots, and implements.

MOREAU (C.) & MOREAU (MIREILLE). **Un cas de flétrissement des Cinéraires.** [A case of *Cineraria* wilt.]—*Bull. Soc. mycol. Fr.*, 73, 1, pp. 94–96, 1 fig., 1957.

A severe wilt of cinerarias at the point of flowering, in a nursery in the Saône-et-Loir Department, France, in 1956, is attributed to *Phytophthora cryptogea* [cf. 25, p. 165].

HIRST (J. M.) & MOORE (W. C.). ***Phytophthora infestans* on *Petunia* and *Datura*.**—*Plant Path.*, 6, 2, p. 76, 1 fig. (between pp. 56 and 57), 1957.

In August, 1956, petunias in two localities at Harpenden, Herts., were infected by *Phytophthora infestans*. In both instances blight was present on potatoes within a few yards. The fungus was also found on leaves of *Datura stramonium*. Isolates were ascertained to belong to race 4 [36, p. 175].

SCHMIDT (TRUDE). **Eine seltene Krankheitserscheinung an Nelken.** [A rare form of disease on Carnations.]—*Pflanzenarzt*, 10, 8, p. 76, 1 fig., 1957.

Anther smut of carnations caused by *Ustilago violacea* [cf. 33, p. 483], which recently occurred in a Viennese nursery, has been rarely observed in Austria.

BALD (J. G.) & CHANDLER (P. A.). **Reduction of the root rot complex on Croft Lilies by fungicidal treatment and propagation from bulb scales.**—*Phytopathology*, 47, 5, pp. 285–291, 1 fig., 1957.

In further studies on the greenhouse root rots of Croft lilies at the University of California, Los Angeles [34, p. 648], an attempt was made to secure healthy plants. Bulbils, obtained from fungicidally treated scales which in turn had been obtained from cured bulbs treated with fungicide [26, p. 339], were given a further fungicidal dip and planted in steam-sterilized soil. Plants which developed leaf symptoms were weeded out, though some were not infected by fungi. Of the 3,500 plants so obtained 2,500 were healthy and 1,648 of these were dispersed to growers. Clones varied considerably in the proportion of infected plants produced. The first unhealthy symptom that developed was a yellowing of the normally white roots, previously associated with *Rhizoctonia* [*Corticium*] *solani* infection, but no *C. solani* was found though a *Penicillium* was in contact with the yellowed areas. This fungus injured the hairs and surface cells but did not penetrate. Similar damage to roots on bulb parts that escaped fungicidal treatment was associated with *Fusarium oxysporum*. Serious damage to individual roots produced yellowing and scorch of the lower leaves or slight general chlorosis. Experimental injury to healthy roots induced no leaf symptoms.

Cultures from discoloured bulb scales yielded *F. oxysporum*, *Pythium ultimum* [36, p. 187], *C. solani*, and bacteria. Subsequent inoculations indicated pathogenic and non-pathogenic strains of *C. solani* and *F. oxysporum*; *P. ultimum* also varied in its degree of pathogenicity. It would appear that while in the field *P. ultimum* is more important as a root rot pathogen, the warmer conditions of the greenhouse favour *F. oxysporum*.

It proved possible to produce bulbils aseptically on potato-dextrose agar from surface sterilized scales free from symptoms; this seems to offer better prospects than fungicidal treatments.

SGANZERLA (M.). **Norme di prevenzione contro la Botrytis dei Gladioli.** [Methods of preventing *Botrytis* of Gladioli.]—*Notiz. Malatt. Piante*, 39 (N.S. 18), pp. 88–92, 1 pl., 1957.

From experiments conducted since 1952 at the Phytopathological Observatory, Milan, Italy, the author concludes that the best means of preventing the infection of gladiolus corms by *Botrytis gladiolorum* [36, pp. 30, 588] is to lift them in September–October, immediately remove all traces of the leaves, and keep them at 20° to 30° C. for at least a fortnight, and then at 10°.

SCHMIDT (TRUDE). **Die Septoria-Blattfleckenkrankheit der Chrysantheme.** [*Septoria* leaf spot disease of Chrysanthemums.]—*Pflanzenarzt*, 10, 8, pp. 74–75, 1 fig., 1957.

Leaf spot caused by *Septoria chrysanthemella* [cf. 17, p. 460] is the only important fungus disease of chrysanthemum in Austria. Control is by phytosanitation, cultivation of the more resistant varieties and, if necessary, spraying with copper or organic fungicides such as ziram.

GOVIER (D. A.). **The properties of Tomato aspermy virus and its relationship with Cucumber mosaic virus.**—*Ann. appl. Biol.*, 45, 1, pp. 62–73, 1 pl., 1957.

At the Department of Botany, Exeter University, chrysanthemum plants sap-inoculated with tomato aspermy virus [cf. 36, p. 321] produced distorted, discoloured flowers [35, p. 18], but displayed only slight leaf mottle. The virus infected 25 of 45 [listed] species of plants in 17 genera. Sap from infected tobacco leaves lost its infectivity when diluted to more than 1 in 10,000, heated for 10 min. at over 65° C., or stored for more than 42 hours at 16° to 18°.

Partial protection was secured between the virus and two strains of cucumber mosaic virus [cf. loc. cit.] on tobacco and *Nicotiana glutinosa* and serological tests confirmed the view that tomato aspermy virus is a strain of cucumber mosaic virus.

MISCHKE (W.). **Durch Insekten übertragbare Viruskrankeheiten an einjährigen Sommerblumen und Stauden.** [Insect-transmissible virus diseases of summer annuals and herbaceous plants.]—*Pflanzenschutz*, 9, 5, pp. 71–72, 1957.

In this further contribution [36, p. 406] the author briefly describes the symptoms and mentions the insect vectors of the following viroses of ornamentals: wallflower breaking (cabbage black ring spot virus); *Tropaeolum* mosaic virus on nasturtium (*Tropaeolum majus*) [34, p. 131]; stock severe and mild mosaic viruses on *Matthiola incana*; larkspur [*Delphinium*] net mosaic on delphinium [31, p. 370]; chlorotic vein-clearing of *Salvia splendens* (reported from Belgium [*Salvia* virus 1; 29, p. 620] and little known in Germany); aster yellows virus [on *Callistephus sinensis*]; and cucumber mosaic virus, the most formidable horticultural virus of today, with roughly 200 hosts.

Cymbidium mosaic.—*Agric. Gaz. N.S.W.*, 67, 10, pp. 526, 556, 1 fig., 1956.

[Orchid] (*Cymbidium*) mosaic virus [35, p. 370] may be distinguished from a number of non-parasitic disorders of cymbidium by the appearance of symptoms in the immature leaves of a new shoot. Roguing provides the most effective control, and aphid vectors should be checked with a suitable insecticide.

SHURTLEFF (M. C.). **Control of turf brown patch.**—*Bull. R.I. agric. Exp. Sta.* 328, 25 pp., 1 col. pl., 2 figs., 2 graphs, 1955. [Received July, 1957.]

Most of the information contained in this useful publication on the symptoms, distribution, spread, and control of brown patch of turf caused by *Rhizoctonia* [*Corticium*] *solani* has already been noticed from time to time in this *Review* [35, pp. 19, 460, *et passim*]. Application of mercury chloride fungicides after watering, with or without the addition of thiram, is recommended for control, supplemented by selection of resistant grass strains.

SMITH (J. D.). **The use of griseofulvin against dollar spot and *Fusarium* patch diseases of turf.**—*Ann. appl. Biol.*, 45, 1, pp. 206–208, 1957.

At the Sports Turf Research Institute, Bingley, Yorkshire, in July 1955, a one-year-old turf of *Agrostis tenuis* with some *Poa annua* was treated with griseofulvin at 220, 440, and 880 $\mu\text{gm.}$ per ml. and two days later inoculated with *Fusarium nivale* [*Calonectria nivalis*: 36, p. 594], the treated area then being covered with hessian strips, which were kept moist. After 14 days, it was found that increases in griseofulvin concentration had been accompanied by significant decreases in infection, though the highest level did not entirely suppress the disease.

Turfs of *Festuca rubra* were treated similarly, inoculated with *Sclerotinia homoeocarpa* [loc. cit.], and later given a second treatment. Griseofulvin reduced infection, the highest concentration being most effective.

In two trials in 1956 against *S. homoeocarpa* on bowling greens of sea-marsh turf (containing *F. rubra*) at Preston and York, griseofulvin in a wettable powder form was less effective than cadmium chloride, phenyl mercury acetate, and mercurous/mercuric chloride, but gave some protection (15 and 8 per cent. infection in the two places, respectively, as against 23 and 27 per cent. for the untreated).

[An account of this work also appears in *J. Sports Turf Res. Inst.*, 9, 32, pp. 203–209, 1956.]

MCALLISTER (D. R.), ALLEN (N. V.), & GLOVER (D. V.). **Witches' broom.**—*Fm Home Sci., Utah*, 18, 2, pp. 35, 50, 2 figs., 1957.

Lucerne witches' broom virus [32, p. 564] is now prevalent in the Uinta Basin,

Utah, where about 90 per cent. of lucerne plants were affected in 1956. The disease has also been reported from Millard County. No lucerne varieties have proved resistant.

YLIMÄKI (A.). **Additional experiments on the chemical control of Clover rot.**—*Valt. Maatalousk. Julk.* 148, pp. 31–49, 3 figs., 1956. [Finnish summary.]

The results of further experiments confirmed previous observations regarding the efficiency of the PCNB compounds, botrilex and brassicol, in the control of *Sclerotinia sclerotiorum* on clover in Finland [34, p. 790; cf. 36, p. 46]. The timing of the treatment appeared to be a much more important factor in its success than either the quantity of the dust or the number of applications: in the autumn of 1954 those given before November to December were ineffectual.

In a preliminary field test both PCNB and captan improved the overwintering of *Lolium multiflorum*, apparently through the prevention of infection by *Typhula* [*T. borealis* and *T. itoana*: 31, p. 556].

HRUSHOVETZ (S. B.), LEBEAU (J. B.), & STELFOX (H. B.). **Production of leaf chlorosis in Clover by the addition of chemicals to the soil.**—*Plant Dis. Repr.*, 41, 2, pp. 120–122, 3 figs., 1957.

Studies on a necrosis and wilt of red clover in the greenhouse at the Experimental Station, Lacombe, Alberta, indicated that several chemicals may induce the condition. Severe symptoms, however, developed only at a soil pH of 8.4, and it is concluded that alkalinity is the most important factor involved [cf. 35, p. 65].

WALKER (J.). **Two chytrid diseases of Subterranean Clover in New South Wales.**—*Aust. J. Sci.*, 19, 5, p. 207, 1957.

From the Biological Branch, N.S.W. Department of Agriculture, Sydney, the author reports the occurrence on the same subterranean clover plants of galls caused by *Synchytrium aureum* [cf. 6, p. 692], of which this is believed to be the first record in Australia, and *Physoderma trifolii* [36, p. 324].

The former species produced numerous small, raised, greenish galls with a reddish or yellow central spot on the petioles, leaf blades, flower stalks, and sterile outer flowers of the seed heads, accompanied by some distortion. The galls measured 200–400 μ in basal diameter and 150 μ in height. They consisted of a mass of plant cells surrounding a central resting spore, 120–200 μ in diameter, with a reddish-brown wall and bright yellow contents. Larger galls, up to 1 mm. in diameter, formed by the fusion of several smaller ones, each with a resting spore, were also observed.

The galls produced by *P. trifolii* contained masses of reddish-brown resting spores, about 40 μ in diameter.

BHIDE (V. P.) & HEGDE (R. K.). **Ergot on Bajri (*Pennisetum typhoides* (Burm.) Stapf and Hubbard) in Bombay State.**—*Curr. Sci.*, 26, 4, p. 116, 1 fig., 1957.

In 1956 ergot [*Claviceps* sp.] was recorded on bajri (*Pennisetum typhoides*) [33, p. 235] in the Bombay and Mysore States of India. Incidence reached 25 per cent. in some late-sown crops. Only the imperfect state of the fungus was found.

WATSON (R. D.) & AL-ADHAMI (A. R.). **Notes on diseases of fruit trees in Iraq.**—*F.A.O. Pl. Prot. Bull.*, 5, 7, pp. 104–107, 3 figs., 1957.

A disease, principally of lemon trees, but also affecting sweet and sour orange and a few tangerines, occurred in an orchard about 90 miles north-east of Baghdad in 1951 and by 1954 had practically eliminated it. Defoliation, preceded by the leaves turning pale green and then yellow, was accompanied by a decrease of starch in the stems, which died progressively. Root suckers replacing these showed the

same sequence. Once affected, trees made little new growth, but even after defoliation had begun blossomed and bore fruit that became increasingly smaller. Elimination of other possible causes suggests a virus origin.

An apple tree in an orchard near Kirkuk was noticeable for the annual enlargement of the terminals of the current year's twigs and proliferation of buds on these. The behaviour of the tree both in spring and autumn was somewhat abnormal, and it remains to be seen if the condition is transmissible.

SCHUCH (K.). **Viruskrankheiten und ähnliche Erscheinungen bei Obstgewächsen.**

[Virus diseases and similar phenomena in fructiferous plants.]—*Mitt. biol. Zent.Anst. Berl.* 88, 96 pp., 105 figs., 1 graph, 2 maps, 1957. [101 refs.]

This valuable monograph on the European viroses of fruit trees and small fruits, with special emphasis on those of importance in Germany [35, p. 372 *et passim*], is based for the most part on foreign contributions to the literature, particularly from the East Malling Research Station. Besides descriptions of the symptoms, the bulletin comprises sections on modes of transmission; selection and maintenance of mother plants; precautionary measures to be taken (a) in nurseries and propagation premises and (b) by fruit-growers; breeding in relation to viroses; and plant quarantine.

MALLACH (N.). **Die wirtschaftliche Bedeutung des Apfelmosaiks.** [The economic significance of Apple mosaic.]—*Prakt. Bl. PflBau*, 51, 6, pp. 225–229, 7 figs., 1956.

After a short description of apple mosaic [cf. 35, p. 683] the author illustrates the extent of loss in Bavarian orchards. From routine records at the Provincial School and Experimental Station for Orchard Husbandry, Schlachters bei Lindau, Bodensee, a comparison was made between two similar trees, one of which was healthy while the other had shown mild symptoms of mosaic for many years. Over a nine-year period the affected tree yielded 55 per cent. less, and over a five-year period the increase in growth was 40 per cent. less. In addition the quality of the fruit was much reduced, and there was premature leaf fall from the more severely affected branches. Records of girth development from another orchard of young trees showed a decrease of 46.4 per cent. in affected trees.

KÖHLER (H.) & FRITZSCHE (R.). **Wirkung von Antibiotikumhaltigen Kulturfiltraten von Angehörigen der Streptomyces-albus-Gruppe auf den Apfelmehltau und Spinnmilben in vivo.** [Action of antibiotic-containing culture filtrates from members of the *Streptomyces albus* group on Apple mildew and Spider-mites in vivo.]—*Anz. Schädlingsk.*, 29, 5, pp. 65–68, 2 figs., 1956.

At the Phytopathological Institute, Aschersleben, Germany, culture filtrates from a number of *Streptomyces* spp., mostly of the *S. albus* group, which had exhibited antibiotic activity in preliminary tests, were examined for activity against apple mildew (*Podosphaera leucotricha*) [cf. 34, p. 77] in greenhouse tests. They were sprayed, with and without a wetter, onto seedlings artificially infected on the previous day. The filtrates from a number of strains, selected because they gave complete protection without toxic effects in these tests, were used in field tests in 1955 on 3-year-old trees. One preparation (301/2), applied three times with wettable sulphur, reduced primary infection on Cox's Orange by 100 per cent. and the secondary to a disease index of 6 (unsprayed, 114), the corresponding figures without sulphur being 98 and 1 and for ultra-sulphur alone 0 and 10. It was found that filtrates active against mildew were likewise active against red spider mites (*Metatetranychus pilosus* [*M. ulmi*] and *Bryobia practiosa*) infesting the foliage. Further work is needed to determine whether the fungicidal and acaricidal actions are due to one active principle.

MARSH (R. W.), MONTGOMERY (H. B. S.), & EDNEY (K. L.). **Experiments on orchard spraying for the control of *Gloeosporium* storage rots of Apples.**—*Plant Path.*, 6, 2, pp. 39–41, 1957.

Details are given of experiments at the Research Station, Long Ashton, Bristol, in collaboration with the Research Station, East Malling, and the Ditton Laboratory, Larkfield, Kent, in which in 1953–4 the spraying of Allington Pippin apple trees at Long Ashton on 17th August and 9th September with 0·1 per cent. captan or 0·2 per cent. ziram gave better results than spraying with 0·1 per cent. glyodin in the control of storage rots by species of *Gloeosporium* [*Neofabraea perennans* and *G. album*: 35, p. 901]. In 1954–5, captan alone was used, and it was found that spraying in both August and September gave better results than spraying in either month alone, a result confirmed in a third trial in 1955–6. Comparable trials carried out in other areas with Cox's Orange Pippin in 1954–5 also indicated that late summer spraying reduced *Gloeosporium* storage rots.

HIRST (J. M.). **A simplified surface-wetness recorder.**—*Plant Path.*, 6, 2, pp. 57–61, 1 pl., 1 diag., 2 graphs, 1957.

A description is given of a 'surface-wetness recorder' which simulates apple shoots and is used for routine determinations of the duration of leaf-wetness needed for the timing of curative sprays against apple scab (*Venturia inaequalis*) [35, p. 777]. It is a development of the earlier 'dew-balance', used in work on potato blight [*Phytophthora infestans*: 34, p. 56]. The test-surface is a block of expanded polystyrene cut to a tetrahedral shape, at the top of a rod of $\frac{1}{4}$ in. diameter, the bottom of which is fitted to one end of the beam of the balance, and the whole suitably counterbalanced. A pen swung from the other end of the beam records changes in its equilibrium on daily charts placed on a rotating drum. Wind oscillation is cushioned by a paddle from the beam immersed in oil.

Maximum weight of water deposited being unimportant, it was unnecessary to reduce the sensitivity of the beam as in the dew balance. The blocks of expanded polystyrene with the upper and lower surfaces sloped gently are easily shaped with a saw or a penknife; as the upper surfaces became eroded, the block was replaced monthly.

Records from this machine and the dew-balance agreed in the case of apple foliage to within ± 1 hour on almost all occasions except during the very early stages of dew formation. In the case of potato foliage agreement was not so good, and for plants other than apple the test surface used might need modification.

WÖSTMANN (E.). **Birnbaumsterben in Westfalen.** [Death of Pear trees in Westphalia.]—*NachrBl. dtsh. PflSchDienst (Braunschweig)*, Stuttgart, 9, 2, pp. 22–25, 2 figs., 1957.

In recent years a die-back of pear trees has been commonly observed in Westfalen-Lippe. The symptoms first appear in summer when a yellowish or yellowish-red discoloration of the foliage of entire branches is followed by premature leaf fall. In the following year the dead branches stand in sharp contrast to the rest of the crown. Patches of bark, reminiscent of sunscald, become sunken, brown or purplish in colour, and finally die. Pycnidia and perithecia appear on the surface of the affected bark, and a species of *Physalospora*, and its three imperfect stages, *Diplodia*, *Macrophoma*, and *Sphaeropsis*, have been isolated together with *Cytospora* and other [unnamed] fungi. Attempts to reproduce the disease by inoculation were unsuccessful, and it was concluded that the condition, which was especially common bordering minor roads recently tarred for the first time, resulted from disturbed metabolic conditions—most probably water shortage.

POSNETTE (A. F.) & ELLENBERGER (CHRISTINA A.). **The line-pattern virus disease of Plums.**—*Ann. appl. Biol.*, 45, 1, pp. 74–80, 1 pl., 1957.

At East Malling Research Station, Kent, grafting a range of fruit trees with plum line pattern virus [35, p. 875] from various sources confirmed field observations that different varieties react differently to the same isolate and different isolates produce different symptoms in the same variety. The choice of indicator varieties is important when virus-free material is being selected by transmission tests; peach seedlings and the mazzard clone F12/1 were the most sensitive types found.

In some plum varieties the virus fails to become fully systemic. In this and other respects it resembles apple mosaic virus [loc. cit.]; three isolates from plum and two of apple mosaic from apple produced similar symptoms in peach and apple. Both viruses tend to induce symptoms only on leaves formed early in the growing season, and it is suggested that they are strains of one virus.

FRITZSCHE (R.). **Die Kirschbäume während der Kirschernte auf Virusbefall kontrollieren!** [Cherry trees should be examined for virus attack during the Cherry picking season.]—*Schweiz. Z. Obst- u. Weinb.*, 66, 14, pp. 321–323, 2 figs., 1957.

The symptoms of cherry Pfeffinger disease [cherry rasp leaf virus: 35, p. 775], the most widespread virus disease of fruit in Switzerland, are briefly described, and the necessity for eliminating affected cherry trees is strongly emphasized. Control is handicapped when many trees have also suffered frost damage.

INGRAM (J.), SCHOFIELD (ELIZABETH R.), & TAYLOR (R. E.). **An observation on the control of Strawberry mildew.**—*Plant Path.*, 6, 2, pp. 63–64, 1957.

In a spraying test in 1956 at Luddington Experimental Horticulture Station, Warwickshire, outstandingly good control of mildew (*Sphaerotheca humuli*) [cf. 36, p. 254] (1·8 per cent. mildewed fruits (from 48 plants), as against 64·2 per cent. for the unsprayed controls) on Royal Sovereign strawberries was obtained with dinitrocaprylphenyl crotonate (1 lb. of a 25 per cent. wettable powder with 7 fluid oz. of a proprietary wetting agent per 100 gals. of water).

NIEMÖLLER (A.). **Phytophthora cactorum verursacht Fruchtfäule an Erdbeeren.** [*Phytophthora cactorum* causes fruit rot of Strawberries.]—*Gesunde Pfl.*, 8, pp. 190–194, 1956. [Abs. in *Z. PflKrankh.*, 64, 6, p. 350, 1957.]

At the beginning of June, 1956, first-year Deutsch Evern strawberry fruits in all stages of development in the area of intensive cultivation between Coblenz-Horchheim and Braubach, Germany, contracted heavy infection by *Phytophthora cactorum* [35, p. 904]. The fungus was observed about a fortnight later causing equally severe damage in two- and three-year-old plantings of the same variety, Madame Moutot, and Regina. The crop was a virtual failure, entailing a loss of at least DM. 800,000. Leather rot has presumably been endemic for years in the district, where the mono-culture of strawberries has been practised for decades, leading to an accumulation of spores in the soil. The sudden epiphytotic was no doubt due to a combination of abundant inoculum and favourable weather conditions, e.g., heavy precipitation followed by high temperatures. Plots treated with lutiram [36, p. 570] against *Botrytis* [*cinerea*] were less affected by both that fungus and *P. cactorum* than the unsprayed.

SCHÖNIGER (G.). **Technische Verbesserungen der Ausläuferpfropfung bei Erdbeeren.** [Technical improvements of runner-grafting in Strawberries.]—*NachrBl. dtsh. PflSchDienst (Braunschweig)*, Stuttgart, 9, 1, pp. 12–14, 3 figs., 1957.

From the Institute for Applied Botany, Würzburg University, two methods are

described for the detection of virus infection in strawberries by grafting on to indicator varieties. The first involves grafting the indicator plant [cf. 31, p. 441], after spraying with systox, to the test plant in the field, and covering both with insect-proof nylon. The indicator may be transferred to the greenhouse after a fortnight. In the second, an indoor method, strong runners are induced on the indicator plant, cut off 10 cm. behind the tip, and tongue grafted to similar runners on the test plant, the cut end of the indicator runner being covered with moist cotton wool and plastic, which may be removed after two weeks.

SCHÖNIGER (G.). **Isolierung eines auf *Fragaria vesca* 'bedingt latenten' Erdbeer-virus.** [Isolation of a 'conditionally latent' Strawberry virus on *Fragaria vesca*.]—*Naturwissenschaften*, 44, 11, p. 333, 1957.

A strawberry virus, apparent only under suitable conditions, was isolated at the Institute of Applied Botany of the University of Würzburg and was transmitted by *Pentatrichopus fragaefolii*, but only within four hours of the vector leaving the source plants. With relatively slow growth at low temperatures symptoms appear after five to six weeks. These consist of marked recurving and irregular shape and colouring of the leaves and shortening of the petioles. Subsequently normal growth is resumed. The appearance and subsequent disappearance of symptoms recurs when plants, after periods of delayed growth in a cool house at 5–15° C., are placed in a hot house (20–25°).

VARNEY (E. H.). **Mosaic and shoestring, virus diseases of cultivated Blueberry in New Jersey.**—*Phytopathology*, 47, 5, pp. 307–309, 1 fig., 1957.

Two new virus diseases of blueberry (*Vaccinium*) are described and figured from the New Jersey Agricultural Experiment Station, New Brunswick. Both occur on cultivated varieties and sometimes on wild plants and are at present of minor importance. Shoestring virus causes red streaks on young twigs, later masked as the wood matures. Affected leaves are narrow and pointed or wavy and distorted and may be green or dull red. Veinbanding may occur to a varying extent. Diseased and symptomless twigs occur indiscriminately. *Vaccinium* seedlings and water shoots occasionally bear narrow, rugose, chlorotic leaves, but this is a physiological disorder.

Mosaic virus results in leaves markedly mottled with yellow and yellow-green areas, sometimes confined to the margins of major veins, varying with variety, and often more intense on the lower leaves. Genetic variegations similar to this mosaic are also common among seedlings.

Both the above viruses were transmitted by budding, shoestring not affecting the inoculated plants completely for three years or more. These diseases are distinct from *Vaccinium* stunt and ringspot viruses [21, p. 496; 33, p. 679], and they may occur together, sometimes two or three in the same plant, there being no apparent cross protection. No vectors are known.

MISHRA (J. N.) & JHA (A.). **Mosaic of Papaya (*Carica papaya* L.) in Bihar.**—*Proc. Bihar Acad. agric. Sci.*, 4, pp. 102–103, 1 pl., 1955. [Received 1957.]

Recently the commercial cultivation of papaw in Bihar has become unprofitable owing to the severity of papaw mosaic virus [35, p. 749] which may affect over 90 per cent. of the plants. Symptoms of the disease in Bihar differ in some respects from those reported from Bombay [28, p. 131] and Puerto Rico [30, p. 279]. In less severely affected plants mottling is frequently observed but constrictions and elongated water-soaked areas on stems and petioles are rarely seen and no flow of latex from the fruit or dark green or brown rings thereon were noted.

TRIPATHI (R. D.). **Malformation disease of the Mango as related to deficiency of mineral nutrients.**—*Indian J. Hort.*, 12, 4, pp. 173–179, 1956.

From studies on mango malformation [34, p. 466] at the Horticultural Research Station, Saharanpur, Uttar Pradesh, by means of plant analysis, solid and liquid injections, and micro-nutrient sprays, it is concluded that the disease is not caused by mineral deficiency.

RUI (D.), CIFERRI (R.), SCARAMUZZI (G.), & BONFANTE (S.). **Ulteriori indagini sulla 'leptonecrosi' da borocarenza dell' Olivo.** [Further researches on 'leptonecrosis' of the Olive, caused by boron deficiency.]—*Notiz. Malatt. Piante*, 39 (N.S. 18), pp. 59–63, 1957.

Observations in 1955 in Italy showed that the beneficial effects of treating olive trees for leptonecrosis due to boron deficiency [36, p. 256] with fertilizers containing major and minor elements persisted for three years in the case of young trees but only for two in that of adult trees at the dosages used. Application of fertilizer containing major elements plus boron increased yields during the year of treatment and to an even greater extent in the succeeding year. Cure was also effected by injecting liquid fertilizer into the soil by means of a soil-injector [cf. 35, p. 779].

TILEMANS (E. M.). **Généralités sur l'agriculture belge. Enseignement de la phyto-pharmacie.** [Generalities on Belgian agriculture. The teaching of phyto-pharmacy.]—*Notiz. Malatt. Piante*, 39 (N.S. 18), pp. 11–39, 1957.

A course of lectures given by the author at Milan University during May, 1956, is summarized. Brief details on Belgian agriculture in general are followed by an account of the use of insecticides, fungicides, and herbicides.

CIFERRI (R.). **Aggiornamento della difesa contro i parassiti vegetali in orticoltura.** [The modernization of the control of plant parasites in horticulture.]—Reprinted from *Riv. Ortoflorofruttic. ital.*, 40, 6 pp., 1956.

The author discusses the use of synthetic fungicides in Italy since the war, especially zineb, which at a dosage of 0.2–0.3 per cent. is stated to be superior to 1 per cent. Bordeaux mixture in the control of fungi against which copper is effective; captan, which at a dosage of 0.125–0.25 per cent. exerts a comparable effect to that of 1 per cent. Bordeaux mixture, and if cheaper could compete with zineb; and karathane, a substitute for sulphur and the polysulphides, used at a concentration of about 0.1 per cent.

HORSFALL (J. G.). **Recenti progressi sulla chemioterapia delle piante.** [Recent advances in the chemotherapy of plants.]—*Notiz. Malatt. Piante*, 39 (N.S. 18), pp. 5–9, 1957.

This is an abstract of a lecture on systemic fungicides given by the author in Italy, in May, 1956. The need to seek products which will release phenols in a plant immediately it is parasitized is stressed.

ZANARDI (D.). **Prove di laboratorio sull' efficacia antifungina di alcuni anticrittogamici.** [Laboratory tests of the antifungal efficacy of certain fungicides.]—*Notiz. Malatt. Piante*, 39 (N.S. 18), pp. 67–71, 2 figs., 1957.

In experiments at the Observatory of Plant Diseases, Pavia, Italy, soil in which plants had been attacked by various fungi (including *Sclerotinia cepivora* [*Sclerotium cepivorum*], *Fusarium* spp., and *Peronospora parasitica*) was placed in Petri dishes and treated with various non-copper containing fungicides. The best results were given by amicina (quinosol 20 per cent.), which completely controlled fungi and bacteria, followed by vapam, completely fungicidal but only partially bactericidal,

nabam, zineb, and PCNB, in that order, the last-named not being particularly active against fungi or bacteria.

MCCALLAN (S. E. A.) & MILLER (L. P.). **Effect of fungicides on oxygen consumption and viability of mycelial pellets.**—*Contr. Boyce Thomson Inst.*, 18, 11, pp. 483–495, 1957.

Control of mycelial growth being less advanced than that of spore germination [cf. 34, p. 534], a study was made at the Boyce Thomson Institute for Plant Research, New York, on the effect of various fungicides on mycelial pellets of *Alternaria oleracea* [*A. brassicae*], *Aspergillus niger*, *Monilinia* [*Sclerotinia*] *fructicola*, and *Myrothecium verrucaria* [35, p. 382]. Cadmium, zinc, cerium, sodium arsenate, and cycloheximide had little or no effect on oxygen consumption or viability, while the toxicity of silver and mercury doubled for each threefold increase in time of exposure. Metallic ions, such as zinc and cerium, were absorbed in very small amounts. Maceration of *A. niger* pellets increased the rate of uptake of silver threefold despite great reduction in oxygen consumption, but had no effect on uptake by *Alternaria brassicae*.

Consumption of oxygen by the pellets, on a fresh weight basis, was one-half to one-third, and with sucrose in the medium, one-third to one-sixteenth that by conidia; with pellets though not with conidia, reduction in viability was a less sensitive response to toxicants than oxygen consumption. Uptake of toxicants by pellets was generally much slower than by conidia, though the ED₅₀ values for silver and dichlone were similar in both cases.

LLEWELYN (F. W. M.). **The scorching of Apple leaves by copper sulphate.**—*Ann. appl. Biol.*, 45, 2, pp. 376–384, 13 graphs, 1957.

This paper is a progress report of fundamental studies at Imperial College, London, and East Malling Research Station, Kent, on the physiology of the fruit tree in relation to the injury inflicted upon it by sprays, based in this case on the degree of scorching caused by copper sulphate as assessed by water loss of the leaves. The methods of measurement are set out and a suggestion made that the action of copper sulphate involves the progressive combination of metabolites in the leaf with the copper ions, each in turn buffering the rising copper ion concentration. Suggestions for further investigation in the light of this theory are indicated.

VENEZIA (M.) & CANNIELLO (A. R.). **Prospettive ed indirizzi sull'impiego dell'orthocide 50 nelle colture frutticole, orticole, e floricole.** [Prospects of and directions on the use of orthocide 50 in fruit, market-garden, and flower crops.]—*Notiz. Malatt. Piante*, 39 (N.S. 18), pp. 79–87, 1957.

An account is given of tests with orthocide 50 on fruit, market-garden, and flower crops by the Società Bombrini Parodi-Delfino, at Rome, during 1953–55. It is suggested that this material should be used against vine mildew [*Plasmopara viticola*]; on table grapes it should be combined with 1 per cent. Bordeaux mixture. The product is regarded as an excellent one, insufficiently appreciated in Italy.

HEY (G. L.). **Karathane. A modern fungicide for mildew control.**—*Comm. Gr.* (formerly *Fruit Gr.*), 3206, p. 1182, 1957.

The advantages of karathane over sulphur against powdery mildews are briefly described [cf. 36, p. 258] and recommendations are given for its use as a wettable powder, dusting powder, and smoke fumigant. Karathane can be safely used on sulphur-shy varieties of apples, pears, gooseberries, and other fruit, and is more

effective than sulphur at temperatures below 65° F., its only disadvantage being that at 90° or over it may damage foliage, particularly in the greenhouse. Its use as a fumigant is of recent development in Great Britain, karathane smokes being now recommended for control of powdery mildew [*Erysiphe cichoracearum*] on cucumber [cf. 34, p. 572] and chrysanthemums.

FAWCETT (C. H.), SPENCER (D. M.), & WAIN (R. L.). **Investigations on fungicides.**

II. Aryloxy- and arylthio-alkanecarboxylic acids and their activity as fungicides and systemic fungicides.—*Ann. appl. Biol.*, 45, 1, pp. 153–176, 1 graph, 1957.

In further studies at Wye College, University of London [cf. 36, p. 42], a wide range of aryloxyacetic acids and corresponding acids with alkyl groups in the side chain, their arylthio- analogues, and griseofulvin were assessed in the plate test for fungistatic effect on *Pythium ultimum*, *Sclerotinia fructigena*, *Verticillium albo-atrum*, *Botrytis cinerea*, *Aspergillus niger*, and *Alternaria solani*, and as systemic fungicides against *B. fabae* on broad beans and *A. solani* on tomatoes. In general, the arylthio- derivatives were more fungicidal than their aryloxy- analogues. The difference was sometimes wide; for example, 100 p.p.m. of α -(2:6-dichlorophenylthio)butyric acid in nutrient agar reduced the growth of *B. cinerea*, *S. fructigena*, and *A. solani* by 51, 32, and 55 per cent., respectively, the corresponding figures for α -(2:6-dichlorophenoxy)butyric acid being 17, 5, and 12 per cent. An exception among the sulphur compounds was α -(3:4-dichlorophenylthio)isobutyric acid, which was less active than its oxygen analogue against *S. fructigena*, *V. albo-atrum*, and *A. solani*. More arylthio- compounds than aryloxy- conferred systemic protection.

Of the four side-chain structures studied, the -acetic, -propionic, and -butyric acids displayed similar *in vitro* antifungal properties against the six fungi, but the isobutyric acids were generally more active; none was better than the others in conferring systemic fungicidal protection.

Most of the compounds were unsatisfactory both as external and as systemic fungicides, but a few that gave appreciable systemic protection were also fungicidal in the plate test; for example, (1-naphthylthio)acetic and α -(3-chlorophenylthio)-isobutyric acids against *A. solani* both within and outside the plant. No compound showed high fungicidal activity and poor systemic properties against the same pathogen, but many gave better protection than would be expected from their *in vitro* antifungal properties.

The systemic fungicidal effect of α -(2-chlorophenylthio)propionic acid in the tomato at 1 to 100 p.p.m. approximated to that of griseofulvin at 50 to 500 p.p.m. The results given by griseofulvin in tomato varied, and its performance in bean was poor throughout. The rapid increase to a steady value in degree of systemic protection achieved within a low range of concentration suggests that the fungicidal protection of tomato plants by α -(2-chlorophenylthio)propionic acid is not due to its fungicidal properties only.

Systemic chemicals.—*Plant Dis. Repr., Suppl.* 234, pp. 123–134, 1955.

These papers on aspects of systemic chemicals were given at a symposium of the American Phytopathological Society at Wooster, Ohio, in 1955. Some of the information has already been noticed in this *Review*.

In an introduction H. C. YOUNG defines 'systemics' to include any chemical that is absorbed by the host, may or may not be translocated, and prevents disease or controls it after infection. J. L. LOCKWOOD deals with antibiotics as systemic fungicides, and notes evidence that their effect is due to entry into the plant tissue. G. A. BRANDES, discussing the role of physiology and basic research, refers to some promising applications to chemotherapy of the growth regulators related to 2,4-D.

W. Q. LOEGERING writes briefly on the project of the United States Department of Agriculture concerning the chemical control of cereal rusts [*Puccinia* spp.], and requests information on any promising chemical available in sufficient quantities for field trials. J. H. DAVIDSON discusses the fungicidal value of methyl bromide [35, p. 31] and ethylene dibromide [35, p. 28] as soil fumigants, and R. F. PHILIPS, writing on the systemic property of streptomycin and its role in combating infections of plants, discusses in some detail the effect of adding glycerol [35, p. 503]. In a short paper on chemotherapeutic control of carnation wilt (*Fusarium oxysporum* var. *dianthi*) [*F. dianthi*: 33, p. 17], W. BROCE, D. F. MILLIKAN, & J. E. SMITH report promising preliminary results with systemic fungicides at the University of Missouri, Columbia. D. F. MILLIKAN & H. W. GUENGERICH write on the use of antimetabolites to control stone fruit viruses at the same University. In 1954 a desirable plum that had not been introduced because of virus infection was treated with 8-azaguanine and thiouracil, separately or in combination, from foliation until cessation of terminal growth, when budwood was removed for propagation. In 1955 growth of trees developing from the inserted buds was unusually vigorous for about two months, then mottling appeared. Indexing on Shirofugen [cherry] showed that of 60 trees, four were free from [peach] necrotic ring spot virus [36, p. 332], two derived from 8-azaguanine-treated and two from thiouracil-treated buds. It is concluded that the treatment has some ameliorating effect but that the protection period is insufficient to obtain completely virus-free budwood. H. G. SWARTWOUT, also of the University of Missouri, writes on some preliminary field trials with actidione. On Dorothy Perkins roses, two applications at 0.5 p.p.m. with 2 oz. and 8 oz. triton in 100 gals. almost eliminated powdery mildew (*Sphaerotheca pannosa*: 35, p. 825) on leaves and flower buds. Two applications at 1 p.p.m. with 1 oz. triton B1956 stopped the development of cedar rust (*Gymnosporangium* [spp.: 33, p. 431; 35, p. 378]) on apple leaves when spraying started as soon as infection appeared, but there was mild black spotting of the foliage and under sides of the fruit. Actidione at 1 p.p.m. plus 3 oz. triton B1956, or with 1 lb. captan and 3 oz. triton, almost eliminated downy mildew (*Plasmopora viticola*) [27, p. 509] on the highly susceptible Thomas variety of vine, moderate spread of infection occurring on the unsprayed controls.

W. H. BRANDT and R. W. ALTHAUS deal with systemics and toxicology, and advocate more caution in the introduction of chemicals. J. B. HARRY considers four methods of evaluating systemic fungicides, namely, seed treatment, soil treatment, infection of plant parts, and surface application to aerial plant parts. W. H. BRAGONIER discusses the testing of fungicides against oak wilt (*Endoconidophora fagacearum*) [*Chalara quercina*: 36, p. 142].

CHADEFAUD (M.). **Mycologie.** [Mycology.]—*ex* A history of botany in France, pp. 219–234, 1 fig., Société d'Édition d'Enseignement Supérieur (for the French Committee of the VIII International Botanical Congress, Paris-Nice, 1954), 1954.

The author presents an account of mycology in France under the headings: the great pioneers, Bulliard and Persoon; the discovery of basidia, Leveillé; polymorphism in fungi, Tulasne; pure cultures, the school of Pasteur; aquatic fungi, Cornu and Dangeard; sexual reproduction and cytology, Sappin-Trouffy, Dangeard, Maire, and Guillermond; and modern systematy of the higher fungi, Quélet and Patouillard.

SNELL (W. H.) & DICK (ESTHER A.). **A glossary of mycology.**—xxxi+171 pp., 15 pl., Cambridge, Massachusetts, Harvard University Press, 1957. 40s.

This glossary, covering a much wider field than the senior author's earlier work [16, p. 480], defines nearly 7,000 terms likely to be encountered in mycological

literature including that dealing with medical mycology and antibiotics. Both technical and popular terms are explained, the derivation, name of the originator, and date of publication being given where known. Colour terms are defined. Fifteen pages of line drawings illustrate terms employed in the description of both micro- and macroscopic characters of fungi.

SARKISOV (A. H.). *Микотоксикозы (грибовые отравления). [Mycotoxicoes (fungal poisonings).]*—216 pp., 5 col. pl., 72 figs., 16 graphs, State Publisher of Agricultural Literature, Moscow, 1954. Roubles 7.80.

The information contained in this unique book on mycotoxicoes, which are stated to be causing great losses among farm animals in the U.S.S.R., is based on literature published in the U.S.S.R. and abroad and on the results of experiments at the Pan-Soviet Scientific Research Laboratory for the Study of Poisonous Fungi and at various scientific, medical centres of the U.S.S.R. Academy of Sciences. The book, intended mainly for specialists in animal farming, includes descriptions of ergotism (*Claviceps purpurea*) [11, p. 445] and clavicepstoxicoes [paspalum staggers] (*C. paspali*) [34, p. 95]; stachybotryotoxicoes (*Stachybotrys alternans*); dendrochyotoxicoes of horses, a fatal poisoning resulting from eating straw infected with *Dendrochium toxicum*; fusariotoxicoes (*Fusarium graminearum*) [*Gibberella zeae*: cf. 10, p. 514]; and toxicoes due to feeding to cattle grain which has overwintered in the field under snow and become infected with diverse moulds (which are listed), particularly *F. sporotrichioides*. Each disease is dealt with under the following headings: determination of the disease, historical survey, etiology, pathogenesis, clinical picture, pathomorphology, differential diagnosis, treatment, prophylactic measures, and control.

It is suggested that mycotoxicoes would be best controlled by organized preventive measures carried out jointly by agronomists and veterinarians.

BUGNICOURT (F.). *Champignons parasites de plantes cultivées en Nouvelle-Calédonie. [Parasitic fungi of cultivated plants in New Caledonia.]*—23 pp., Nouméa, Institut français d'Océanie, 1956. [Mimeographed.]

Among the diseases of economic importance not included in the previous catalogue of parasitic fungi from New Caledonia [33, p. 615] are *Puccinia purpurea* on sorghum [map 212]; *Corticium salmonicolor* [map 122] on custard apple, pigeon pea, citrus, quince, and apple; *Phytophthora citrophthora* [map 35] on orange; *Elsinoe australis* [map 25] on citron; *Thielaviopsis [Ceratocystis] paradoxa* [map 142] on coco-nut; *Fusarium bulbigenum* var. *lycopersici* on tomato; and *Cercospora nicotianae* [map 172] on tobacco.

JAMALAINEN (E. A.). *Overwintering of plants in Finland with respect to damage caused by low-temperature pathogens.*—*Valt. Maatalousk. Julk.* 148, pp. 1-30, 14 figs., 1956. [Finnish summary.]

Most of the information in this review has been included in previous contributions from the Agricultural Research Centre, Tikkurila [36, p. 7 *et passim*].

NIKOLIĆ (V.). *Bibliografija radova iz oblasti zaštite bilja objavljenih u FNRJ od 1945-1952.* [A bibliography of papers concerning plant protection published in the FPRY from 1945-1952.]—*Posebna Izd. Inst. Zashit. Bilja, Beograd [Spec. Edit. Inst. Plant Prot., Beograd]* 2, 38 pp., 1954. [English preface.]

This bibliography of Yugoslav publications on the protection of agricultural crops and forest trees against weeds, pests, and diseases is divided into two main parts, books and brochures (pp. 5-9) and articles (pp. 9-35). A number of conference and miscellaneous papers are noted on pp. 35-38.

GAUGER (W. L.). **Variation in monosporic isolates of a strain of *Verticillium albo-atrum* R. & B.**—*Diss. Abstr.*, 16, 11, pp. 2009–2010, 1956.

Single-spore isolates from a culture of *Verticillium albo-atrum* [cf. 36, p. 430] with predominantly uninucleate conidia formed by division of a single nucleus in the sterigma were studied at Purdue University [Lafayette, Indiana]. Four types of colony were distinguished on the basis of microsclerotial characteristics, presence or absence of a mucoid growth habit, number of conidia produced, and the amount of aerial mycelium. The frequency with which each type was isolated was unpredictable.

Variant types were often recovered when the monosporic cultures were single-spored, but all were of a colony type previously encountered.

Host index of *Verticillium albo-atrum* Reinke & Berth. (including *Verticillium dahliae* Kleb.).—*Plant Dis. Repr., Suppl.* 244, pp. 24–49, 1957.

This list of 354 hosts of *Verticillium albo-atrum* is arranged under woody and herbaceous plants, the former being sub-divided into (1) trees, and (2) shrubs, bushes, small fruits and lianas, and the latter into (1) field crops, vegetables, and small fruits, and (2) ornamentals, 'flowers', and weeds.

CIFERRI (R.) & CORTE (A.). **Tre anni di osservazioni sui rapporti tra malattie crittogamiche delle piante ed irrigazioni a pioggia.** [Three years' observations on the relations between cryptogamic diseases of plants and overhead irrigation.]—*Notiz. Malatt. Piante*, 39 (N.S. 18), pp. 51–58, 1957.

Notes are given on the intensity of infection developed by a large number of plant species at the Botanical Gardens of the University of Pavia, Italy, during a period of three years of (a) overhead irrigation or (b) either watering of the roots or no artificial irrigation. The results [which are tabulated and discussed] indicated that there was slightly more fungal infection among the plants subjected to overhead irrigation than among the remainder.

CIFERRI (R.) & CORTE (A.). **Scala per la valutazione dell'incidenza delle malattie delle piante e la valutazione della difesa.** [A scale for the evaluation of plant disease incidence and for the evaluation of control.]—*Notiz. Malatt. Piante*, 39 (N.S. 18), pp. 41–50, 1957. [English summary.]

After briefly discussing existing methods of estimating the intensity of plant diseases [cf. 36, p. 604, *et passim*], the authors suggest a full scale of notation for laboratory work, together with two simplified forms for field work. The equation for the computation of disease incidence (I.M.), based on intensity (I.I.) and diffusion (I.D.) is
$$I.M. = \frac{\sum (I.I. \times p) + \sum (I.D. \times p)}{2P}$$
 where p is the number of plants or organs to which the work refers and P the number of plants examined.

BALDACCINI (E.) & BETTO (E.). **L'impiego del P^{32} in biologia vegetale, come tracciante. Difficoltà metodologiche e valutazione dei risultati.** [The use of P^{32} in plant biology as a tracer. The practical difficulties and evaluation of the results.]—*Ric. sci.*, 26, 5, pp. 1425–1432, 1956. [French, English, and German summaries.]

In this account of the practical and biological difficulties experienced in the use of the radioactive isotope P^{32} the authors point out that a comparison may properly be made only between different portions of the same leaf. Small injuries to the plants, accidental or purposely inflicted, may lead to differences in the absorption of P^{32} which falsify the results. In experimental infections with obligate parasites,

such as species of *Uromyces*, without wounding the tissue, difficulty arises in evaluating the P^{32} present in the infected organs because of necroses and injuries caused by the formation of sporogenous pustules on the leaf surfaces, with laceration of the epidermis. It appears, however, to be possible to 'mark' the spores with P^{32} to study their pathogenic action on the host.

CHEVAUGEON (J.). **Sur l'existence chez des plantes arbustives d'affections cryptogamiques à temps de latence indéfini.** [On the existence in woody plants of cryptogamic disorders with an indefinite period of latency.]—*C. R. Acad. Sci., Paris*, 244, 20, pp. 2549–2551, 1957.

In humid intertropical regions *Glomerella cingulata* f. *manihotis* (usually in its conidial state, *Colletotrichum gloeosporioides* f. *manihotis*) is responsible for anthracnose of the leaves, fruits, branches, and stems of cassava [36, p. 82], while the most serious damage to the reserves in the roots is caused by apical necrosis. Among clones of 16 varieties examined in a moderately fertile soil in the lower Ivory Coast the percentage of necrotic branches ranged from 0 in Kokossokro to 16.9 in Agba Kokore seven months after planting the cuttings. The depletion of the soil consequent on the cultivation of cassava for three years in succession culminated in 42.4 per cent. infection in a very susceptible line. After another year (the normal duration of a cycle) in an excessively dense planting of 30,000 stools per ha. the percentage of necrosis in the same line rose to 45.1, while an extension to 16 months resulted in a further increase to 56 per cent.

The number of branches showing external symptoms is consistently smaller than those actually harbouring the pathogen in their tissues. For instance, the examination of surface-sterilized material of 500 apparently healthy Kokossokro branches revealed the presence of acervuli in 67 per cent. after 15 days in a moist chamber. This is a strikingly higher incidence than the maximum observed in the plantation where conditions were most favourable for the development of *G. c. f. manihotis*, denoting that a large proportion of the infections occurring in the field remain latent for an indefinite period. Clones of the same variety inoculated with spore suspensions may also continue to look healthy indefinitely unless certain environmental factors are modified in an unfavourable direction. Thus, continuous darkness induces the development of foliar anthracnose in a fortnight and of apical necrosis in 27 to 40 days. Similarly, anthracnose of the leaves begins to appear on the seventh day in plants kept for a fortnight in a very humid atmosphere at a temperature of 38° C., followed by death after 20 to 27 days. Comparable results may also be achieved by alterations in the pH of the soil to the equivalent of at least one unit above or below the normal of 4.5.

The limited invasion of the internal tissues of a woody plant by a fungus without the development of external symptoms is not peculiar to cassava. Reliable indications have been observed, and are in process of confirmation, of a similar phenomenon in *Hevea* rubber, *Cinchona ledgeriana*, and coffee (*Coffea canephora*) [cf. 27, p. 280].

CRAVERI (R.). **Un metodo di saggio dell'effetto degli antibiotici sui vegetali.** [A method of testing the effect of antibiotics on plants.]—*Riv. Biol. Perugia*, 48, (N.S. 8), 2, pp. 139–143, 1 pl., 1956. [English summary.]

A method of testing the effect of antibiotics on plants is described. Wheat seeds are placed on a piece of silk gauze covering a glass tube somewhat smaller in diameter and shorter than the beaker containing it, which latter is filled to the top of the tube with a solution of the antibiotic in water or a suitable organic solvent at a strength pre-determined as not phytotoxic. The effect of the antibiotic on the plants and its systemic and antimutagenic properties are studied at 16° to 22° C. and at a relative humidity of 65–75 per cent.

FROMMER (W.). **Erfahrungen mit Streptomyceten-Dauerkulturen.** [Experiences with permanent cultures of streptomycetes.]—*Arch. Mikrobiol.*, 25, 3, pp. 219–222, 1956.

After four to six years' maintenance on glycerin (0.25 per cent.)-glycocoll (0.1) agar (2) covered with mineral oil [cf. 36, p. 485], some 5 per cent. of the 2,300 strains of soil streptomycetes tested at the Organo-Chemical Institute, Göttingen, Germany, were no longer viable, while scarcely any produced aerial mycelium without repeated subculturing. Loess loam, ground, sifted, and mixed with quartz sand (6:4) and tap water (75 ml. per kg.) to secure a friable structure, proved to be a suitable medium for the preservation of streptomycetes; after 1½ years all the 700 isolates tested were still viable and in most cases mycelial development was more copious than at the time of isolation [cf. 26, p. 511].

WALLEN (V. R.) & MILLAR (R. L.). **The systemic activity of cycloheximide in Wheat seedlings.**—*Phytopathology*, 47, 5, pp. 291–294, 1 fig., 1957.

At the Canada Department of Agriculture, Ottawa, the systemic activity of cycloheximide [actidione] in Garnet wheat seedlings [cf. 35, p. 5] was assayed by placing portions of treated plants in cultures seeded with *Saccharomyces pastorianus* or by using filter paper disks previously soaked in chloroform extracts of ground plant tissues. Actidione sprayed on to the leaves was recoverable from the tissues up to five weeks after application when applied at 500 p.p.m., and was absorbed even at 50 p.p.m. The antibiotic was also shown to be absorbed by the roots from quartz sand and soil and translocated throughout the tissues. It was not present in tissues formed after application of the antibiotic. The amount of absorption by the roots was directly proportional to the quantity applied to the substrate.

Paper chromatography of the active material in chloroform extracts and in guttation fluid from treated plants gave Rf values similar to those of the pure solution.

SANCHEZ (J. L.). **Acción antibiótica del *Aspergillus flavus* sobre el *Phytophthora infestans*.** [Antibiotic action of *Aspergillus flavus* on *Phytophthora infestans*.]—*Bol. Exp. agropec.*, Lima, 5, 3, pp. 24–28, 1956.

A strain of *Aspergillus flavus* isolated at the La Molina Agricultural Experiment Station, Peru, was found to have a marked antibiotic effect upon *Phytophthora infestans* [cf. 33, p. 315] while not visibly inhibiting the growth of 14 other pathogens.

WRIGHT (JOYCE M.) & GROVE (J. F.). **The production of antibiotics in soil. V. Breakdown of griseofulvin in soil.**—*Ann. appl. Biol.*, 45, 1, pp. 36–43, 1 graph, 1957.

In further work at Imperial Chemical Industries, Ltd., Welwyn, [cf. 36, p. 543], griseofulvin [see next abstract], added to fresh garden loam, disappeared rapidly after an initial lag. When more griseofulvin was added, it at once became inactivated at rates which increased with each successive addition. The numbers of a species of *Pseudomonas* present in the soil increased steadily after introduction of the antibiotic.

When a little soil was added to a solution (pH 7) containing inorganic salts and griseofulvin as the sole carbon source, the griseofulvin disappeared within five days. The *Pseudomonas* sp. thought to break down the antibiotic in soil was isolated from the broth. A dematiaceous fungus caused the breakdown of griseofulvin in a broth at pH 5 when soil was added.

The *Pseudomonas* sp. also degraded a closely related amine and dechloro-griseofulvin. Cl⁻ was present in the solutions after degradation by the *Pseudomonas*

in an amount that agreed well with that calculated if all the chlorine in the griseofulvin supplied was liberated in this form. Spectrophotometric examination of the solutions showed no metabolites with the aromatic ring intact, and confirmed the complete breakdown of griseofulvin. It is concluded that griseofulvin does not, probably, play an important part in biological processes in the soil.

CAMPBELL (A. H.). **Present status of griseofulvin as a plant protectant.**—*Meded. LandbHooesch. Gent*, 21, 3, pp. 519–524, 1956.

A review is presented of the work on griseofulvin [35, p. 701 and preceding abstract] at Glaxo Laboratories Ltd., Stoke Poges, Bucks., and at Rothamsted Experiment Station, Harpenden, Herts.

ORSENIGO (M.). **Estrazione e purificazione della cochliobolina, una tossina prodotta da *Helminthosporium oryzae*.** [Extraction and purification of cochliobolin, a toxin produced by *Helminthosporium oryzae*.]—*Phytopath. Z.*, 29, 2, pp. 189–196, 1 diag., 2 graphs, 1957. [German and English summaries.]

After extraction and purification the toxin secreted by culture filtrates of *Helminthosporium oryzae* [*Ophiobolus miyabeanus*: 36, p. 423] and herein designated cochliobolin appears as a crystalline, white powder, with a melting point between 180° and 182°, barely soluble in water but dissolving completely in chloroform and acetone. It proved to be highly toxic to rice seedlings, inhibiting the growth of roots and coleoptiles at a very low concentration (30 p.p.m.), apparently through severe damage to the plasma.

GUTTER (Y.). **A micro moist chamber for fruit inoculation.**—*Bull. Res. Coun. Israel*, 4, 4, pp. 392–393, 1 fig., 1955. [Received July, 1957.]

Inoculation studies at the Agricultural Research Station, Rehovot, Israel, have shown that a preferable alternative to the glass bell-jar for maintaining high humidity is covering the point of inoculation on a fruit with a small bell, easily made by cutting off the end of a broken test tube and attaching it with melted paraffin.

STEPHEN (R. C.). **A simple spore trap.**—*Nature, Lond.*, 179, 4574, pp. 1360–1361, 1957.

A description is given of a spore trap designed for use at the Tobacco Research Board of Rhodesia and Nyasaland; it is suitable for less elaborate data and is less expensive than that of Hirst [31, p. 618]. A convergent cone (7¼ in. diameter narrowing to 3¼ in. by 12 in. long), facing into the wind, fits, by means of a 2 in. long cylindrical neck, into a divergent cone, both being made of aluminium. In the central neck a holder retains two 3- by 1-in. glass microscope slides at a constant angle of 30° to the horizontal. Two wind vanes are fixed on the top and bottom of the rear cone. The cones are mounted on a pivot ending in a lubricated 60° angle point, which ensures that they are very sensitive to slight changes in winds of low velocity. The trap is operated at a height of 6 ft. above the ground and has given good results for more than a year. A film of paraffin and rubber lubricant on the slides made a satisfactory sticker.

RACK (K.). **Beschreibung und Arbeitsweise eines einfachen Sporenfängergerätes.** [Description and mode of operation of a simple spore trap apparatus.]—*Z. PflKrankh.*, 64, 6, pp. 332–340, 1 fig., 2 diags., 3 graphs, 1957. [English summary.]

A full description is given of the principles and application of a spore trap [cf. 34, p. 798 *et passim*] designed primarily for the prognosis of outbreaks of pine needle cast (*Lophodermium pinastri*) in Germany [35, p. 731], with a discussion of its

advantages and sources of error. It consists essentially of a glass funnel moving horizontally, its wide aperture kept facing towards the oncoming wind [cf. 29, p. 102] by means of a vane, while the narrow exit at the back of the tube, diagonally shortened, almost touches an inclined glass slide on which the spores are trapped. The funnel is further surrounded by a system of tubes to intensify the current of air by means of the Venturi effect. Wind velocity is measured by a rotatory fan. When the rate is slow the spores are trapped by gravitation, while the impaction effect operates at higher speeds. Variations in the efficiency of the trap due to changes in wind velocity may be considerably reduced by the addition of more slides.

Of the different adhesives used, an aqueous substance such as glycerine proved superior for the trapping of the hyaline spores present in the air only under humid conditions, while an oily one, such as vaseline, was better for the thick-walled spores moving in dry weather. All-important factors in the trapping process are also undoubtedly the electric charges of the adhesives on the one hand and the spore-carrying mist droplets on the other.

MELIN (E.) & NILSSON (H.). **Transport of C^{14} -labelled photosynthate to the fungal associate of Pine mycorrhiza.**—*Svensk bot. Tidskr.*, 51, 1, pp. 166–186, 3 figs., 1957.

At the Institute of Physiological Botany, Uppsala, Sweden, seedlings of *Pinus sylvestris* were raised from sterilized seeds on terra-lite with nutrient solution in Erlenmeyer flasks [33, p. 370]. After two months the substrate was inoculated with *Rhizopogon roseolus* or *Boletus variegatus*, and, after the formation of mycorrhiza, the seedlings were permitted to photosynthesize labelled carbon dioxide for 30 or 60 min. Five hours later the hyphal mantles were removed, and, together with samples of uninfected root tip, stem, and leaf, examined for content of radioactive carbon. It was found that assimilation products were rapidly transported in considerable amounts to the mycorrhizal mycelia and to the root tips.

FRYDMAN (I.). **Mykotrofizm roślinności pokrywającej gruz i ruiny domów Wrocławia.** [Mycotrophism of plants covering rubble and ruins of Wrocław houses.]—*Acta Soc. Bot. Polon.*, 26, 1, pp. 45–60, 6 figs., 1957. [English summary.]

During a survey of the ten-year-old bombed sites in Wrocław, Poland, of the 140 species of plants recorded over 50 per cent. were found to be mycorrhizal, the majority possessing endotrophic mycorrhiza, among which the tolypophagous type predominated.

These studies support the conclusions of Dominik [32, p. 688] that the appearance of mycorrhiza depends on the stabilization of the substratum, the accumulation of humus, and completion of soil composition.

GAMBOGI (P.). **Influenza del substrato sulla forma e dimensioni dei conidi di una *Pestalotia* isolata da legno alterato.** [The influence of the substrate on the shape and dimensions of the conidia of a *Pestalotia* isolated from damaged wood.]—*Nuovo G. bot. ital.*, N.S., 63, 2–3, pp. 248–256, 2 figs., 1 graph, 1956.

When grown on various natural and artificial media, the conidia of *Pestalotia lignorum* [as yet undescribed] from wood of felled poplar displayed marked differences in dimensions. Total length (including setae) ranged from 13.2 to 31.7 μ (averages 19.42 μ (on cypress branch) to 24.57 μ (on 'agar-minimo' medium)); breadth 4.85 μ (on onion tissue) to 7.78 μ (on bean agar with saccharose).

GREGG (MARY). **Germination of oospores of *Phytophthora erythroseptica*.**—*Nature, Lond.*, 180, 4577, p. 150, 2 figs., 1957.

At the Department of Botany, University College, Dublin, oospores from four-

to six-week-old oat agar cultures of *Phytophthora erythroseptica* were germinated following passage through the garden snail (*Helix aspersa*). In preliminary experiments the germination of *P. cactorum* oospores was similarly stimulated.

RIGGENBACH (A.). **Fomes lignosus, a pyrimidine-deficient fungus.**—*Nature, Lond.*, 180, 4575, pp. 43–44, 1957.

Attempts to culture *Fomes lignosus* on artificial media at the Rubber Research Institute, Ceylon, were unsuccessful. The addition of organic materials, such as yeast or malt extract, rubber wood, or leaf decoctions resulted in luxuriant growth. In a study of the growth requirements of *F. lignosus* [cf. 32, p. 272] uniform inoculum was obtained by growing the fungus for 42 days on fresh rubber wood, then adding 100 ml. sterile distilled water and shaking the culture flasks to obtain a mycelial suspension. *F. lignosus* was able to synthesize the thiazole part of thiamine but not the pyrimidine. Growth in Knop's solution with 10 gm. per l. glucose and added thiamine or pyrimidine was unsatisfactory unless asparagine was added.

AMICI (ADRIANA). **Azione del MCPA su *Alternaria solani* (E. et M.) J. et Gr.** [The action of MCPA on *Alternaria solani* (E. & M.) J. & Gr.]—*Agricoltura ital.*, 56 (N.S., 11), pp. 70–77, 1 fig., 1 graph, 1956. [German summary.]

In further work at the Institute of Plant Pathology, University of Milan, Italy, MCPA was not utilized as a carbon source by *Alternaria solani* [35, p. 916] and did not inhibit the growth of the fungus, though the colonies formed were pale. When MCPA was the chief or only carbon source very little mycelium was produced, and the fungus is evidently unable to utilize this material.

BALDACCI (E.) & AMICI (ADRIANA). **Sul comportamento di funghi, attinomiceti, e semi di fanerogame di fronte a MCPA.** [On the behaviour of fungi, actinomycetes, and seeds of phanerogams in the presence of MCPA.]—*Nuovo G. bot. ital.*, N.S., 62, 1–2, pp. 362–364, 1955. [English summary. Received May, 1957.]

When attempts were made to grow 34 species of fungi in agar culture in the presence of MCPA [see preceding abstract] with and without glucose, 17 grew in the absence of glucose and 15 did not; all except two grew in the presence of glucose. Actinomycetes were more sensitive to MCPA plus glucose than to MCPA alone, but this relation was reversed for moulds.

BUXTON (E. W.), LAST (F. T.), & NOUR (M. A.). **Some effects of ultraviolet radiation on the pathogenicity of *Botrytis fabae*, *Uromyces fabae*, and *Erysiphe graminis*.**—*J. gen. Microbiol.*, 16, 3, pp. 764–773, 4 graphs, 1957.

At Rothamsted Experimental Station, the pathogenicity of *Botrytis fabae* and *Uromyces fabae* on broad bean and *Erysiphe graminis* on barley as assessed by counts of lesions or pustules was decreased by ultra-violet irradiation [cf. 35, p. 64]. In *E. graminis* and *B. fabae* infectivity was lost more than viability. Damage to the spores of all three species by ultra-violet light was mitigated by subsequent exposure to daylight. The irradiation of host leaves before inoculation decreased the number of pustules of *E. graminis* on barley, had no effect on the lesions of *U. fabae*, and increased those of *B. fabae* on broad bean, which were also increased by rubbing with celite prior to inoculation, both possibly increasing the production of foliar exudates stimulating the pathogen [cf. 34, p. 670]. More pustules of *E. graminis* developed on irradiated barley leaves kept in daylight than in the dark, but infection by unirradiated spores of *B. fabae* on irradiated broad bean was unaffected by subsequent exposure to daylight or darkness.

BJORNSSON (IDA P.). **Effects of light on *Stemphylium*, *Trichoderma*, *Botrytis*, and certain other fungi.**—*Diss. Abstr.*, 16, 12, p. 2290, 1956.

Following a preliminary screening of 13 fungi at the University of Maryland three were intensively studied for morphological and physiological responses to illumination. With *Botrytis gladiolorum* light affected sporulation, 'ridging', and the formation of sclerotia; with *Stemphylium* sp. sporulation, growth, and pigmentation of the mycelium and medium were affected; and with *Trichoderma* sp. sporulation, but not growth, was affected.

The fungi used could be segregated into five groups on the basis of their light requirements (long or short duration, high or low intensity).

1957 Potato handbook. Disease control issue.—79 pp., 10 figs., Potato Association of America, New Brunswick, New Jersey, 1957.

Articles of plant pathological interest in this handbook deal with the control and prevention of potato disease through seed certification programmes, by C. W. FRUTCHEY; potato seed treatment, by W. G. HOYMAN; control of potato diseases by spraying, by R. BONDE; and control of the following diseases: common scab (*Streptomyces* [*Actinomyces*] *scabies*), by W. J. HOOKER; ring rot [*Corynebacterium sepedonicum*], by G. H. STARR; *Verticillium* wilt [*V. albo-atrum*], by J. G. McLEAN and R. V. AKELEY; late blight [*Phytophthora infestans*], by L. C. PETERSON; virus diseases, by R. E. WEBB; and southern bacterial wilt (*Pseudomonas solanacearum*), by L. W. NIELSEN and F. L. HAYNES.

BALDACCI (E.), BAUER (M.), DORIGATTI (R.), ENDRIZZI (C.), FACCINI (G. C.), FOGLIANI (G.), GÖSEN (O.), MARINI (E.), & UGHI (G.). **Aspetti fitopatologici della coltura della Patata da seme in Italia.** [Phytopathological aspects of the cultivation of the seed Potato in Italy.]—*Genet. agr.*, 6, 1-2, pp. 161-286, 2 figs., 12 graphs, 1956. [German summary.]

This is a series of papers describing a co-operative experiment carried out by the Institute of Plant Pathology and the Phytopathological Observatory, University of Milan, Italy, in collaboration with other institutes and official bodies from 1952 to 1954, in which 100 tubers of the early, medium, and late potato varieties, Tonda di Berlino, Majestic, and Ackersegen, were grown in 20 different localities of the Trentino and Alto Adige areas at altitudes up to 1,900 m. The tubers were selected for quality of parentage and the progeny was grown, after selection, in different areas of the plains (Voghera and Trento). Attention was mainly paid to virus diseases.

The results of the work in 1952 and 1953 showed that the tubers grown at the highest altitudes were more free from virus diseases than those grown lower down. In general, viroses were most prevalent at under 800 m., successive multiplications here giving rise to numerous plants with rugose mosaic and leaf roll. Health appeared to be best preserved in areas where one cultivar dominated.

In 1953 it was ascertained that aphids arrived late at the highest elevations and colonies were sparse, whereas in the valley areas the aphid population was early and numerous. Further work is in progress.

***Synchytrium endobioticum* (Schilb.) Perc. Potato wart disease in Europe and the Mediterranean Basin in 1956.**—xi+9 pp., Paris, European and Mediterranean Plant Protection Organisation, 1957. [With French version. Mimeographed.]

A general review of the potato wart disease (*Synchytrium endobioticum*) situation in Europe in 1956 [cf. 34, p. 478] is followed by notes on its occurrence in the various countries considered separately. No outbreak was recorded from any country bordering on the Mediterranean, no recurrence of the 1955 outbreaks

being observed either in Italy or Yugoslavia [cf. 34, p. 810; 35, p. 121]. No case has been seen in Portugal for several years [26, p. 216]. In the northern belt, it is only in Jersey, Guernsey, and Iceland that the disease has never been recorded. Of the 15 other countries which reported from this region, eight were faced with new outbreaks, five recorded the disease again in areas known to be infected, and only in Northern Ireland [cf. 35, p. 153] and Luxembourg were there no cases. Infection was slight in Austria and Denmark [cf. 35, p. 350] but more severe than usual in Germany, Scotland, and Norway. The position was nowhere alarming, and the number of resistant varieties available is steadily increasing.

JOHNSON (G.) & SCHAAL (L. A.). **Chlorogenic acid and other orthodihydricphenols in scab-resistant Russet Burbank and scab-susceptible Triumph Potato tubers of different maturities.**—*Phytopathology*, 47, 5, pp. 253–255, 4 graphs, 1957.

At the Colorado Agricultural Experiment Station, Fort Collins, the chlorogenic acid concentration in the periderm of Russet Burbank potatoes, resistant, and Triumph, susceptible to *Streptomyces* [*Actinomyces*] *scabies* [35, p. 484] was estimated by paper chromatography, and the total *o*-dihydricphenols by Arnow's method (*J. biol. Chem.*, 18, pp. 531–537, 1937). Immature tubers (20 to 40 gm.), rapidly growing tubers (90 to 160 gm.), mature tubers, and those stored for five months at 35° to 38° F. were sampled, peel approximately 1 mm. thick being obtained with a 'nee action' peeler. The concentrations were much higher in the scab resistant variety, particularly in rapidly growing tubers (at which stage scab infections are generally initiated), and the ferric chloride test [33, p. 555] should be applied at this stage. There was apparently little difference in the polyphenol content of the flesh of the two varieties, which was in any case very low compared with the peel.

BONDE (R.) & GETCHELL (J. S.). **Survival of the ring-rot bacteria in wet Potato pulp from the starch factories.**—*Amer. Potato J.*, 34, 5, pp. 133–135, 1957.

Experiments at the Maine Agricultural Experiment Station, Orono, in connexion with the use of potato pulp for feeding livestock revealed that ring-rot bacteria [*Corynebacterium sepedonicum*: 35, p. 39] in wet potato pulp from a starch factory will mostly die in storage after three to seven days [cf. 23, p. 119] but that a few may survive for as long as 17 days at 40° F. Temperatures of 50° to 55° were less favourable for survival.

GEMEINHARDT (H.). **Untersuchungen über den Saprophytismus des *Colletotrichum atramentarium* (B. et Br.) Taub. und die Lebensdauer der Sklerotien (Acervuli) des Pilzes.** [Studies on the saprophytism of *Colletotrichum atramentarium* (B. & Br.) Taub. and the longevity of the sclerotia (acervuli) of the fungus.] - *Phytopath. Z.*, 29, 2, pp. 151–176, 5 figs., 2 diags., 1957.

Some of the information in this contribution from the Institute for General Botany of the Friedrich Schiller University, Jena, Germany, has already been noted [35, p. 541].

Colletotrichum atramentarium sporulates so feebly, if at all, on sterile soils that it can scarcely be identified microscopically in the presence of particles. However, a sterile soil of moderate nutritional content does provide the essential conditions for the production of sclerotia, which thrive on straw and other pectin- and cellulose-containing plant debris. Thus, while nutritional scarcity may limit development it does not preclude the subsistence of the fungus. However, a saprophytic growth habit appears to be definitely excluded by the failure of *C. atramentarium* to develop in the presence of soil antagonists, notably the highly active actinomycete strain G35. In agar cultures the antibiotic effect was observed to be fungicidal (through conidial lysis) as well as fungistatic.

Sclerotium-bearing parts of stems harboured 75 and 90 per cent. viable sclerotia after five months' burial in compost and field soil, respectively. At the end of eight months those in the field were still 68 per cent. viable as compared with only 5.4 per cent. in compost.

Observations on diseased stem material that had overwintered on the ground in the open showed that the fungus had retained its viability almost without exception. The results of conidial trapping experiments confirmed the hypothesis that potato tops may serve as a source of infection when the sclerotia, from which the conidia are abstricted, are extruded from the dead stem tissues and subsequently disseminated in dry weather by wind and during a wet spell by raindrops.

BOYD (A. E. W.). **Field experiments on Potato skin-spot disease caused by *Oospora pustulans* Owen & Wakef.**—*Ann. appl. Biol.*, 45, 2, pp. 284–292, 1957.

Of 24 potato varieties tested at the Edinburgh and East of Scotland College of Agriculture, Edinburgh, for resistance to skin spot (*Oospora pustulans*) [cf. 35, p. 873 and next abstract], Kerr's Pink was the most susceptible; Arran Banner, Majestic, and King Edward were highly susceptible; and Home Guard and Golden Wonder were highly resistant. Thymol and tetrachloronitrobenzene, dusted on to the pits at lifting, failed to give adequate control, which was, however, secured by means of an organo-mercury dip [cf. 22, p. 449]. Incidence was greatly decreased by storing in boxes instead of pits, digging about one month before normal harvest, or by cutting the haulms at this time and digging at the normal time. Ware tubers had significantly more infection than seed tubers of the same crop, indicating that susceptibility increases as the tubers approach maturity.

The disease would be comparatively unimportant if it were not associated with reduced sprout emergence caused by eye infection. In Kerr's Pink the stand was not usually reduced as much by skin spot as in King Edward. Eye infection may vary and not be related to the severity of the general superficial infection and its effect on emergence may be complicated by the vigour of sprout growth. In future, the assessment of varietal susceptibility should be based on the degree of eye infection as a measure of the economic importance of the disease.

ALLEN (J. D.). **The development of Potato skin-spot disease.**—*Ann. appl. Biol.*, 45, 2, pp. 293–298, 1 fig., 1957.

In studies at the University of Edinburgh it was ascertained that humid conditions before and after infection of Kerr's Pink potato tubers by *Oospora pustulans* [see preceding abstract] increased the incidence of disease. It was also found that infection occurs most frequently when the tubers are approaching maturity.

The pathogen may enter the tuber through the lenticels and also through the buds, invasion of the cortex and the production of a cork cambium taking place shortly after infection has occurred. Damage to buds became apparent under the microscope within 16 days of inoculation. The long period between infection and the development of skin-spot symptoms is apparently due to the fact that while the affected pocket of cortical tissue soon dies, visible discoloration of the periderm may not occur for two months.

DOLING (D. A.). **Physiologic races of *Phytophthora infestans* (Mont.) De Bary in Northern Ireland.**—*Ann. appl. Biol.*, 45, 2, pp. 299–303, 1957.

A brief summary of the information in this paper on the determination of the races of *Phytophthora infestans* [cf. 36, p. 661] in Northern Ireland has already appeared [35, p. 390]. The inoculation technique involved the use of detached full-grown but unmaturing leaves, kept moist by Keay's method [34, p. 669], inoculated with one drop of zoospore suspension at each of three points on each leaflet, and incubated at 14° to 19° C. Susceptible hosts produced circular black

lesions and conidiophores within six days, resistant ones only small, black spots. There were few intermediate reactions.

DE LINT (M. M.). **Rentabiliteit van de bestrijding van de Aardappelziekte (*Phytophthora infestans* (Mont.) de Bary).** [Profitability of the control of Potato blight (*Phytophthora infestans* (Mont.) de Bary).]—*Landbouwvoorlichting*, 14, 6, pp. 280–284, 1957.

From experiments on the chemical control of potato blight (*Phytophthora infestans*) in various localities of the Netherlands during 1953–56 [35, p. 709], it is concluded that treatment is definitely profitable both for susceptible varieties, e.g., Bintje and Eigenheimer, and for less susceptible, such as Voran, the former requiring six and the latter two to three applications of copper oxychloride or zineb.

DE LINT (M. M.) & BOOGAARD (E. W.). **Het loofklappen en doodspuiten in 1956.** [Beating down and lethal spraying in 1956.]—*Landbouwvoorlichting*, 14, 7, pp. 308–317, 2 figs., 1957.

The results of further experiments in the Netherlands on the control of potato blight (*Phytophthora infestans*) by (a) beating down the haulms and (b) killing them with chemical sprays as alternatives to hand-pulling generally confirmed those of the two previous years [35, p. 920]. Sodium arsenite was again superior to DNC in oil in the suppression of new growth, which was further reduced by applying the second treatment as long as possible (9 to 12 days) after the first. Primary infection by *P. infestans* was virtually absent and tuber rot unimportant, except in North Brabant, where the percentage in the beaten-down and sprayed plots was 5 as compared with 11 in the hand-pulled. *Rhizoctonia* [*Corticium*] *solani* again caused infection averaging 6.4 per cent. of moderate degree and 4.1 of heavy in the beaten-down and sprayed plots as compared with 4.7 and 1, respectively, in the hand-pulled.

KÜTHE (K.). **Möglichkeiten zur Erhaltung und Verbesserung des Pflanzgutwertes von Kartoffeln. Vorläufige Mitteilung.** [Possibilities for the maintenance and improvement of the 'seed' value of Potatoes. Preliminary note.]—*Pflanzenschutz*, 9, 5, pp. 65–71, 1957.

A tabulated survey is given of the results of experiments in 1954–5 to determine the efficacy in the Giessen district of Germany of spraying once or twice with systox (or metasystox in the later tests) for the control of potato leaf roll virus by exterminating the vector, *Myzodes* [*Myzus*] *persicae* [cf. 35, p. 388].

The average reduction of infection secured in 1955 (a year of low aphid populations) ranged from 37 to 54 per cent. and the increase in yield was estimated at 10 per cent. In three preliminary tests in 1954, when aphid infestation was heavier, the incidence of leaf roll was reduced by 50 per cent. and the yield increased by 30. Early lifting (four or preferably six weeks before the normal date of harvesting) [loc. cit. et passim] appeared to contribute to an improvement in the disease situation only where the percentage of leaf roll in the untreated stands exceeded 10.

It is calculated that a net gain of DM 177 per ha. should accrue to the grower using his own 'seed' from the application of two aphicidal treatments.

HENKE (O.). **Untersuchungen über den Stoffwechsel blattrollkranker Kartoffelpflanzen.** [Studies on the metabolism of leaf roll-diseased Potato plants.]—*Zbl. Bakt.*, Abt. 2, 110, 11–15, pp. 361–377, 4 figs., 1957.

Further studies are reported from the Institute for Phytopathology, Naumberg a.d. Saale, Germany, on the influence of potato leaf roll virus on metabolism [35, p. 841], again using the Mittelfrühe and Ackersegen varieties. It was found

that the inhibited hydrolysis of reserve protein in infected tubers observed during emergence cannot be attributed to a change in the chemical composition induced by the virus, since there was no difference in electrophoretic behaviour between diseased and healthy material, and moreover, no alteration in the amino acid content could be demonstrated by paper chromatography.

There were heavy accumulations of both glutamine and asparagine (particularly the latter) in the infected tubers, those of Mittelfrühe containing 0.518 mg. per gm. dry matter as compared with 0.12 in healthy ones, while the corresponding figures for Ackersegen were 0.9 and 0.46, respectively. Since the function of asparagine is the transport of soluble nitrogen within the plant, the disturbed nitrogen metabolism of young plants from infected tubers is presumed to be connected with changes in the amide balance of the latter.

It was substantiated by means of infiltrations and supplementary provision of the plants with soluble nitrogenous compounds in the form of amino acids and amides that the leaves of infected plants are less active than healthy ones in protein synthesis, whereas in the tubers the relative positions are reversed.

The applicability of Cornuet's method of leaf roll diagnosis, based on the increased glutamine content of the tubers [33, p. 313], was tested on dormant material with inconsistent results. The activity of the asparaginase bore no relation to the generally increased concentration of asparagine in the infected tubers.

During emergence the diseased tubers showed much greater polyphenoloxidase activity and more copious melanin production than healthy ones, but during the vegetation and storage periods these criteria could not be used for diagnostic purposes.

BAUDART (E.). Dosage des acides aminés du virus X de la Pomme de terre par chromato-électrorhéophorèse. [Amount of amino acids of Potato virus X estimated by chromatic electrorheophoresis.]—*Parasitica*, 13, 2, pp. 42-49, 1957.

Studies at the State Agricultural Institute, Gembloux, Belgium, on the amino acids in two strains of potato virus X (M11-M12 and Sterk) differing widely in pathogenicity, which were carried out by means of chromato-electrorheophoresis (*Bull. Soc. chim. Belg.*, 66, pp. 251-255, 1957), are described and the results tabulated. From the differences in amino acid content of the two strains it is concluded that changes affecting the virulence of the virus and its symptoms are correlated with a change in its amino acid constituents.

HANSEN (S. E.). Undersøgelser over Kartoffelvirus X. II. Spredning i marken. [Studies on Potato virus X. II. Spread in the field.]—*Tidsskr. Planteavl*, 61, 2, pp. 277-291, 1957. [English summary.]

Mention has already been made of the writer's studies on the spread of potato virus X in the field in Denmark [35, p. 481]. During 1951-54 spread from one plant to another in the same row was twice as frequent as between plants in adjacent rows. Similarly, about twice as much infection developed in plants next to the infector plants as in those separated from the latter by two or three plant distances. The incidence of infection increased progressively with delay in lifting between 7th July and September.

With 33 per cent. infector plants the total amount of virus X in the Bintje variety increased during one season by the factor 1.2, or 20 per cent. taking an average of 38 experiments during the four-year period. Complete infection, however, occurred in only 16 per cent. of the newly attacked plants. The incidence of total tuber infection was 44 per cent. Partial infection of the tubers was rare, healthy sprouts developing beside the diseased ones only in 2 or 3 per cent.

JOHANSEN (R. H.). **Field resistance of the Potato selection ND 457-1 to virus Y.**—*Amer. Potato J.*, 34, 6, pp. 169-176, 1957.

At the North Dakota Agricultural College, Fargo, ND 457-1 potatoes were compared with the susceptible Red Pontiac variety for resistance to potato virus Y [34, p. 609]. Both varieties were planted in each of two plots, one adjacent to a planting of Nanking cherry (*Prunus tomentosa*) and the other $\frac{1}{2}$ mile from any trees or shrubs, ND 530 being used as the source of inoculum for transmission of the virus by aphids. Recordings at intervals of five weeks revealed that 58.2 per cent. of Red Pontiac and 3.38 per cent. of ND 457-1 showed symptoms of potato virus Y in plot 1, the figures in plot 2 being 5.58 and 0, respectively. Greenhouse results showed that not all infected plants were recorded in the field, but a similar infection rate existed for two varieties. All plants showing visual symptoms of potato virus Y gave a positive reaction when tested on *Nicotiana glutinosa*, which test also indicated that neither variety was a symptomless carrier.

SOMMEREYNS (G.). **Quelques observations relatives au virus Y de la Pomme de terre chromatographié sur papier.** [Some observations on Potato virus Y chromatographed on paper.]—*Parasitica*, 13, 2, pp. 39-41, 1957.

In work at the Phytovirological Laboratory, Gembloux, Belgium, in which sap from Samsun tobacco plants experimentally infected with various strains of potato virus Y was chromatographed, it was ascertained that displacement of the virus on the paper takes place during the process and that the serological reaction of tobacco plants inoculated with the eluates was much stronger than that of the control plants inoculated at the same time with non-chromatographed sap. Further, the strains of virus Y kept on tobacco plants in the greenhouse during the period of the experiments (October-November) gave slight symptoms and a weak serological reaction one month after inoculation, comparable to those of the control plants inoculated with non-chromatographed sap. The increased antigenic activity of the sap from plants carrying virus Y treated on filter paper may be related to the elimination of certain inhibitors during chromatography, which would favour a more intense development of the virus protein. Detailed results are to be presented later.

BALDACCI (E.). **Il potassio e le malattie crittogamiche del Riso.** [Potassium and the cryptogamic diseases of Rice.]—*Kalium-Symposium*, 1955 (published by the Istituto Internazionale della Potassa, Berne), pp. 471-483 [? 1956. German, French, English, and Spanish summaries.]

In experiments conducted at the Institute of Plant Pathology, Milan University, Italy, potassium, applied either as a top dressing, at sowing, or at transplanting time, at 1.4 to 2.4 cwt. per acre, markedly reduced the infection of rice by *Piricularia oryzae* [cf. 35, p. 924]. It was rather less effective against *Helminthosporium oryzae* [*Ophiobolus miyabeanus*: 35, p. 923]. It is known to be of use against *Sclerotium oryzae* [*Leptosphaeria salvinii*: 34, p. 813], though ineffective against *Fusarium moniliforme* [*Gibberella fujikuroi*: 35, p. 923]. By favouring the formation of complex carbohydrates it strengthens the cell walls of plants and so increases resistance to parasites which develop in the parenchyma.

CORBETTA (G.). **Un marciume dei semi di Riso germinati in campo.** [A rot of Rice seeds germinated in the field.]—*Riso*, 5, 5, pp. 15-17, 4 figs., 1956.

In the spring of 1954, rice seeds germinated in the field in Italy were severely attacked by various aquatic phycomycetes mainly belonging to the Saprolegniaceae and usually saprophytic or only weakly parasitic. The disease was initiated by zoospores present in the soil, when the temperature of the water present was about

10° C. The year was characterized by low temperatures in April and May, and the seed used was of poor quality. The disease occurs annually in the rice fields, but damage is seldom serious. Control consists in the use of viable, mature seed of good quality.

CORBETTA (G.). **Un agente patogeno del Riso : *Fusarium moniliforme* Sh.** [A pathogenic agent of Rice: *Fusarium moniliforme* Sh.]—*Riso*, 5, 9, pp. 5–8, 6 figs., 1956.

After stating that rice foot-rot (*Fusarium moniliforme*) [*Gibberella fujikuroi*: 35, p. 923] has recently spread widely in Italy, where it was first reported in 1938 [18, p. 54], the author gives a brief account of the disease under the headings: history, pathogenesis and experimental reproduction, damage caused, and control.

SUBBA-RAO (N. S.). **In vivo detection of gibberellic acid in 'foot-rot' infected Rice (*Oryza sativa* L.).**—*Proc. Indian. Acad. Sci.*, Sect. B, 45, 2, pp. 91–94, 1 pl., 1 graph, 1957.

The author describes a chromatographic method used at the University Botany Laboratory, Madras, for qualitative and quantitative determination of gibberellic acid in rice plants infected with *Gibberella fujikuroi* [36, p. 209]. In the susceptible MTU 9 variety there was a greater accumulation of gibberellic acid in the shoots than in the roots.

AKAI (S.), SHISHIYAMA (J.), & EGAWA (H.). **The free amino acids of Rice plants, Kameji and Magatama, and their change in diseased ones due to the attack of the Helminthosporium blight fungus, *Cochliobolus miyabeanus*.**—*Forsch. PflKr.*, Kyoto, 6, 1, pp. 7–10, 1956. [Japanese, with English summary.]

At Kyoto University, plants of the resistant Kameji and susceptible Magatama rice varieties were inoculated in the pre-flowering stage with *Cochliobolus [Ophiobolus] miyabeanus* [36, p. 208] and the amino acid content analysed chromatographically. Alanine, aspartic acid, glutamic acid, histidine, lysine, and valine were found in the leaves of 38-day-old seedlings of both varieties but glycine was not then found in Kameji leaves. Before flowering most of the amino acids were present in both varieties with the exception of arginine, asparagine, cystine, glutamine, and tyrosine, but proline was found only in Magatama leaves. More than twice as much valine and leucine, but less than half the amounts of aspartic acid, glutamic acid, and glycine, were observed in Kameji as compared to Magatama. In the inoculated leaves the amino acid content found in healthy plants decreased, markedly in the case of aspartic and glutamic acids, threonine, serine, and valine.

It is concluded that the more amino acids, especially the last-named, there are in rice plants, the higher will be their consumption by *O. miyabeanus* and hence the more severe symptoms in susceptible as compared to resistant varieties.

TOYAMA (A.). **The effect of sugars on the conidial germination of *Cochliobolus miyabeanus*.**—*Forsch. PflKr.*, Kyoto, 6, 1, pp. 25–32, 2 figs., 1956. [Japanese, with English summary.]

In studies at Kyoto University on conidial germination and appressoria formation of *Cochliobolus [Ophiobolus] miyabeanus*, and on the behaviour of the germ tubes in sugar solution [cf. 29, p. 327; 32, p. 147], the conidia of isolate 13 began to germinate immediately in distilled water while those of isolate 58 did so only after 80 min. Germination, and elongation of germ-tubes, was accelerated in both isolates by the addition of glucose, galactose, arabinose, mannose, maltose, or fructose, optimum concentration being about 0.4 M in each case; xylose, however, did not have this effect and was somewhat suppressive to one isolate. Appressoria

formation in both isolates was delayed or suppressed by glucose and galactose at 0.4 M, but increased at 0.1 M. In sugar solutions there was sometimes a tendency to formation of new conidiophores and conidia at the germ-tube tips. In glucose or galactose solution at more than 0.1 M the growing germ-tubes showed a tendency to coil clockwise, as a result of a contact stimulus from the slide.

AKAI (S.) & OKU (H.). **On the antifungal effect of 2-methyl-1, 4-naphthoquinone (vitamin K₃) to *Cochliobolus miyabeanus*, the causal fungus of gomahagare-disease of Rice plants.**—*Forsch. PflKr.*, Kyoto, 6, 1, pp. 33-36, 1956. [Japanese, with English summary.]

The authors describe the results of studies at Kyoto University on the toxic effect of 2-methyl-1,4-naphthoquinone (vitamin K₃), and also that of the -SH group containing vitamin K₃ compounds, to *Cochliobolus* [*Ophiobolus*] *miyabeanus* [cf. 35, p. 835; 36, p. 208]. Mycelial growth in liquid culture was completely inhibited by vitamin K₃ at 2×10^{-3} per cent.; but this effect was reversed when cysteine-hydrochloric acid was added and the pH adjusted to 8. Vitamin K₃ activity was also antagonized by vitamin B, but not by amino acids.

Magnesium deficiency.—*R.R.I. Plant. Bull.* 31, pp. 66-69, 1 col. fig., 1957.

Notes are given concerning the use of the standard fertilizer mixture advocated by the Rubber Research Institute of Malaya with the addition of magnesium sulphate to counter magnesium deficiency in rubber [35, p. 392], the symptoms of which are described and figured (in colour). Alternatively, magnesium limestone may be added [cf. 35, p. 324], either direct to the trees ($\frac{1}{2}$ lb. per tree up to three years old, 1-3 lb. to older trees) or to cover crops. Kieserite ($\frac{1}{4}$ -1 lb. according to age) may be used in extreme cases, and gives quicker results, though more expensive, and with danger of phytotoxicity.

Malnutrition diseases of plants.—*Agric. Gaz. N.S.W.*, 68, 3, pp. 137-139, 4 figs., 1957.

This note on plant malnutrition caused by mineral deficiency in the soil contains a tabulated list of seven minor elements sometimes lacking in New South Wales, with recommended applications for various crops.

WALKER (L. C.). **Leaf analysis—a potential forestry tool.**—*Bett. Crops*, 40, 10, pp. 25-26, 42-43, 3 figs., 1956.

Analyses of potassium in soil and the leaves of many species of plants at the School of Forestry, University of Georgia, showed that in six the leaf values were related to the levels in the plough horizons. White pine (*Pinus strobus*) was a useful indicator, yielding consistent values for July and August samplings. Potassium in the needles decreased throughout the growing season to 0.6 per cent. in July and 0.4 in August. *Prunus serotina* showed the same trend with a value of 0.6 per cent. for a poor site, but in some species the potassium present appeared to be independent of season. Leaf levels were increased by 200 lb. potassium chloride per acre in spring.

Where the plough-zone potassium content was below 20 p.p.m. white pine needles were short and chlorotic, turning brown and dropping prematurely, perhaps after one season. The content of normal needles ranged from 0.53-0.84 in July and 0.4-0.55 in August. By mid-August *P. serotina* leaves with under 0.8 per cent. potassium developed bright red margins; by late September this colour had extended to the tip and was intensified by blue and purple shades.

Another potential indicator of potassium deficiency is grey birch (*Betula populi-folia*), which developed leaf chlorosis in mid-August when the level fell below 1 per cent. An interveinal browning of blackberry leaves, closely resembling the

natural autumn coloration, appears to occur only when potassium falls below 0.8 per cent.

The described symptoms resemble those commonly attributed to magnesium deficiency in fruit trees (especially cherry). Low levels of the two elements are, in fact, often associated, but no such connexion was observed in the present study.

JACKSON (R. M.). **Fungistasis as a factor in the rhizosphere phenomenon.**—*Nature, Lond.*, 180, 4576, pp. 96–97, 1 fig., 1957.

At the Soil Microbiology Department, Rothamsted Experimental Station, conidia of *Gliocladium roseum* and *Paecilomyces marquandii* on glass slides coated with 2 per cent. agar containing 0.5 per cent. peptone were unable to germinate when introduced into fresh fertile soil [32, p. 643] but when pea seedling roots came into contact with the slides, the conidia germinated. Similar results were obtained with conidia of *Fusarium solani* and two unidentified *F.* isolates, using seedlings of pea, wheat, and lettuce. Conidia of *F. solani* and one of the *F.* sp. germinated in the presence of soil to produce a terminal chlamydospore on a short germ-tube without further growth until the chlamydospores were stimulated by seedling roots. The germ-tubes of *G. roseum* and the three *F.* spp. studied exhibited a strong tropic growth towards the seedling roots.

The stimulation of germination in previously inhibited fungus spores is probably due to a root exudate, and would contribute to the relative abundance of fungi on and near roots compared with soil at a distance.

JAGNOW (G.). **Untersuchungen über die Verbreitung von Streptomyceten in Naturböden.** [Studies on the distribution of streptomycetes in natural soils.]—*Arch. Mikrobiol.*, 25, 3, pp. 274–296, 3 graphs, 1956.

Samples of various soils were collected in different parts of south-west Germany and Switzerland during 1953–54 and examined for their streptomycete content at the Institute for Microbiology of Göttingen University. The organisms were most abundant (up to 60 per cent. of the microbial population) in the 26 samples from calcareous dry turf and dry forest soils, and fewest in acid soils with a reaction below pH 5. The next highest numbers were provided by turf and rocky clefts on a silicate subsoil (48 per cent.) and neutral to slightly acid forest soils (40), and the lowest (29) by acid forest soils. The first two sites were the most prolific in antagonistic strains, 70 per cent. inhibiting the growth of *Bacillus subtilis* (only 7 per cent., however, to any marked extent). *Mycobacterium lacticola* was inhibited by 27 per cent. of all the isolates and *Escherichia coli* by 21 per cent. Of the dry turf isolates 48 per cent. exerted a strong repressive action on *Aspergillus terreus*, while 25 per cent. of those from acid forest soils were only weakly inhibitory.

The inhibitory substances secreted by the antagonists were weakened by filtration of the culture solution through soil, and they could not be demonstrated at all in cultures on sterile soil.

Studying the occurrence and proportions in these isolates classified by Baldacci in 'series' [34, p. 488], the author observed a correlation between individual groups and certain types of site but no close correlation between plant associations and streptomycete populations.

AGNIHOTHRUDU (V.). **Aspergilli from the soils of South India.**—*Naturwissenschaften*, 44, 3, p. 65, 1957.

At the University Botany Laboratory, Madras, species of *Aspergillus* [cf. 35, p. 124] were isolated more frequently than any other soil fungi from 170 soil samples tested (83 of free soils, 87 from the rhizospheres of various plants, mostly weeds). Of the *A.* species isolated, 25 were from the rhizospheres and 15 from free soils.

PATEL (P. N.), PRASAD (N.), MATHUR (R. L.), & MATHUR (B. L.). **Fusarium wilt of Cumin.**—*Curr. Sci.*, 26, 6, pp. 181–182, 1957.

Fusarium oxysporum f. *cumini* is the name proposed for the fungus first recorded on cumin in North Gujarat and in Rajasthan, India, causing serious losses. The disease usually appears in patches at the end of December or when the crop is a month old, affected plants wilting and drying up at all stages of growth. Typical symptoms developed on cumin after soil inoculations with a spore suspension and the fungus was reisolated. No other host was found by inoculation.

VANDERWEYEN (A.). **Une maladie foliaire du Poivrier cultivé.** [A leaf disease of the cultivated Pepper.]—*Bull. agric. Congo belge*, 48, 2, pp. 365–370, 2 figs., 1957. [Flemish summary.]

In August, 1955, pepper [*Piper nigrum*] in the Belgian Congo developed a progressive wilt of the foliage, starting as irregular, blackish lesions which enlarged and turned grey. The necrosed tissues frequently dropped out, and if the necrosis was generalized the whole leaf fell. *Rhizoctonia* [*Corticium*] *solani* [36, p. 308] was isolated. Inoculations of healthy, wounded pepper leaves with mycelium from an infected plant gave positive results, the fungus being reisolated.

The lower leaves are attacked first, the source of infection being the soil. The affected trees had been ten months in position before the outbreak, which occurred after an application of compost to the foot of the trees. With a further application there was a recrudescence of the disease on the lower leaves. The pathogen may attack a high proportion of the leaves, progressing under favourable conditions more rapidly than new leaves are formed. A weak plant may lose all its leaves, and young trees are particularly susceptible. Heavy losses may occur in dense, neglected plantings.

Control methods recommended include the collection and destruction of infected leaves at least once a week, avoiding over-shading of transplants, and disinfection of organic fertilizers with a 0.2 per cent. organo-mercury commercial fungicide.

GOLENIA (A.). **Obserwacje nad występowaniem szarej pleśni (*Botrytis cinerea* Pers.) na plantacjach Rącznika w Wielkopolsce.** [Observations on the occurrence of grey mould (*Botrytis cinerea* Pers.) on Castor Bean plantations in the Posen district.]—*Acta agrobot.*, 5, pp. 19–32, 8 figs., 1956. [English summary.]

The morphology, biology, and ecology of grey mould (*Botrytis cinerea*) and its development on castor bean (*Ricinus communis*) in the Posen district of Poland [35, p. 487] are described. Field observations indicate that the chief sources of infection of the fruit clusters are the dead or dying flowers and leaves, on which the fungus grows saprophytically.

KING (N. C.) & DICK (J.). **Methods of testing for mosaic resistance compared.**—*S. Afr. Sug. J.*, 41, 5, pp. 361, 363, 1957.

Four methods were used in the tests of sugar-cane varieties of the N.50 series for resistance to mosaic virus [35, p. 588] reported in this paper from Natal, which was read at the 31st Congress of the South African Sugar Technologists' Association. They were: (1) the routine planting of alternate lines of infected canes and new varieties, the whole field being then planted with maize to ensure a supply of the vector, *Aphis maidis*; (2) field tests from which infected canes were excluded but the interplanted maize was inoculated; (3) glasshouse tests in which the cane was inoculated by abrasion; and (4) glasshouse tests in which aphids collected on infected maize were caged on the plants.

The incidence of mosaic in the field trials was considerably lower than in the other two methods. For instance, in 1955–6 N. 50/177 developed 22 per cent. in

the field as compared with 100 and 87 by methods (3) and (4), respectively, the corresponding figures for N. 50/85 being 6, 77, and 45; for N. 50/90, 0, 47, and 53; N. 50/91, 3, 87, and 42; and N. 50/123, 0, 78, and 13, respectively. For some of the other varieties included as controls the figures were as follows: N. 10, field 0, method (3) 50, (4) 18; N. 19, 3, 80, and 16; N.Q. 1, 0, 81, and 62; Co. 281, 23, 48, and 83; N. Co. 339, 9, 51, and 100; N. Co. 349, 12, 87, and 100; and N. Co. 376, 1, 87, and 61, respectively. The only completely immune variety out of 26 tested was N. 50/215, selected for breeding and not for commercial cultivation.

It is concluded from these experiments that artificial methods of testing may produce misleading results by forcing infection on varieties which would not contract the disease under natural conditions.

ANTOINE (R.). **Le traitement des boutures de Canne dans la lutte contre la maladie du rabougrissement des repousses.** [The treatment of Cane cuttings in the control of the ratoon stunting disease.]—*Rev. agric. suc. Maurice* (formerly *Rev. agric. Maurice*), 36, 1, pp. 31–38, 1 pl., 2 graphs, 1957.

Most of this information on the treatment of sugar-cane with hot water or hot air for the control of ratoon stunting virus [36, p. 353] in Queensland and the United States has already been noticed in this *Review*.

STEIB (R. J.), FORBES (I. L.), & CHILTON (S. J. P.). **A report on further studies on the ratoon stunting disease of Sugarcane in Louisiana.**—*Sug. J. N. Orleans*, 19, 10, pp. 35, 37, 1957.

Comparative experiments to determine the relative efficiency of various methods of heat treatment in the control of ratoon stunting virus of sugar-cane in Louisiana [36, p. 2] are described in this paper, presented at the Annual Meeting of the American Society of Sugarcane Technologists on 26th February, 1957. An examination of the plant cane progeny from the hot air-treated stalks of C.P. 44–101 and C.P. 36–105 revealed 17.5 per cent. infection when the internal temperature was maintained at 50° C. for four hours, but five hours' exposure to the same temperature eliminated the virus. After three hours at 52° there was a 5 per cent. infection in C.P. 44–101, but a four-hour treatment at the same temperature was effective, as also were exposures to 53° for two hours and to 54° for one.

The same varieties with the addition of Q. 28 were treated with hot water at 50° for two and 2½ hours. The two-hour exposure failed to eliminate infection from C.P. 44–101 and Q. 28, while the latter still harboured the virus after 2½ hours, when the other varieties were clean. Neither the hot-air nor hot-water treatments reduced germination in the spring.

In yield tests with treated stalks, disease-free C.P. 44–101 gave an average increase of 9 and 17 tons per acre in the plant cane and first stubble, respectively, the corresponding figures for C.P. 36–105 being 9.4 and 15.9. The average yield reductions between plant cane and first stubble in the diseased plots of C.P. 44–101 and C.P. 36–105 were 4.4 and 6.9 tons per acre, respectively. In the clean plots the increases in the first stubble over the plant cane in the two varieties were 3.6 and 0.4 tons per acre.

A comparison of yields between disease-free and inoculated cane of the C.P. 29–116, C.P. 29–320, C.P. 33–224, C.P. 47–193, C.P. 48–103, and N. Co. 310 varieties revealed increases in plant cane plots of the former group except for C.P. 29–116, C.P. 47–193, and N. Co. 310. In the first stubble crop a significant increase was observed in the disease-free plots of all the varieties. Plant cane weights taken in 1956 showed that highly significant yield increases may be expected from treated cane in a year of low rainfall. They were as follows (per acre): C.P. 28–19, 10.5 tons; C.P. 29–320, 8.9; C.P. 34–120, 7.7; C.P. 36–105, 8.5; C.P. 44–101, 11.2; and Co. 290, 4.1.

Spread of ratoon stunting from plant cane to first stubble by means of the knife was very rapid, rising from 16 to 47 and from 50 to 80 to 90 per cent. between the former and the latter stages of growth.

The total cost of heat treatment for a ton of cane in the electric oven is \$13.00. At such a figure the direct planting of treated cane for commercial production would be uneconomic, but the cost could be reduced to \$2.17 per ton by planting the progeny after one year and to 47 cents by postponement until after the second year.

VISWANATHAN (T. S.). **A new species of *Pyrenochaeta* from Sugarcane in India.**—*Curr. Sci.*, 26, 4, pp. 117–118, 1 fig., 1957.

Pyrenochaeta indica n.sp., differing from *P. sacchari* described from Brazil [18, p. 346] in its smaller pycnidiospores (3 to 6 by 2.5 μ), is recorded on sugar-cane from Poona, India.

YEN (W. Y.) & CHI (C. C.). **Leaf blast of Sugar-cane.**—*J. Sugarcane Res.*, 8, 2, pp. 83–98, 4 pl., 3 figs., 1954. [Chinese, with English summary. Received May, 1957.]

A new leaf blast observed on the sugar-cane variety N: Co. 310 in Puli, Formosa, was first apparent as long, narrow, yellowish spots which became purplish red, 3 to 25 by 0.5 to 1 mm. Eventually the lesions extended and coalesced to affect the whole leaf, which withered and died. Perithecia measuring 88 to 153 (mostly 120.62 to 149.96) μ long by 94.5 to 169.5 (110.84 to 143.44) μ wide appeared as minute black dots on the dead leaves and were found to belong to a previously undescribed species of *Didymosphaeria*, *D. taiwanensis* n.sp. The asci were 58.68 to 97.8 (61.94 to 78.24) by 9.13 to 13.69 (9.78 to 13.04) μ and the ascospores 16.3 to 23.8 (20.21 to 22.5) by 3.26 to 4.89 (3.91 to 4.53) μ .

YEN (W. Y.), LO (T. C.), & CHI (C. C.). **Black stripe disease of Sugar-cane.**—*J. Sugarcane Res.*, 7, 1, pp. 1–15, 3 pl., 2 figs., 1953. [Chinese, with English summary. Received May, 1957.]

A new disease observed on the sugar-cane varieties P.O.J. 2883 and N: Co. 310 in Formosa is termed black stripe. Small, round or oval, yellow spots on the leaves develop into long, narrow, streaks and turn blackish brown. A previously undescribed species of *Cercospora*, *C. atrofiliiformis* n.sp., isolated from the lesions, has filiform, slightly curved, hyaline conidia, generally with 2 to 22 septa, not constricted at the septum, and measuring 14.67 to 212 by 1.95 to 4.5 μ .

DINGLEY (JOAN M.). **Life-history studies of New Zealand species of *Nectria* Fr.**—*Trans. roy. Soc. N.Z.*, 84, 3, pp. 467–477, 4 figs., 1957.

At the Plant Diseases Division, Auckland, New Zealand, single spores from freshly collected perithecia of 26 species of *Nectria* [cf. 36, p. 127] were germinated on Difco prune agar and transferred to potato dextrose agar, the cultures then being incubated for three weeks at 25° C. followed by three weeks in the light at room temperature. The conidia in the cultures were compared with those found associated with perithecia in the field. Perithecia formed in some of the cultures.

According to the structure of the perithecia the species of *Nectria* fell into three groups: five (including *N. ochroleuca*) with hyaline perithecial walls, pigment in globules, and a diffuent sub-hymenial layer; five with hyaline or lightly pigmented perithecial walls and a thickened, pigmented sub-hymenial layer; and 16 with pigmented and thickened perithecial walls. In the first group the unicellular conidia fall into the genera *Dendrochium*, *Gliocladium*, or *Verticillium* and are catenulated from pulvinate, pale, erumpent sporodochia; in the second there is no common conidial form, and the species appear to be unrelated; in the third the species may

be placed in three groups with conidia typical of the form genera *Tubercularia*, *Cylindrocarpon* (including *N. galligena* and *N. pinea*), and *Fusarium*, respectively. Species with *Cylindrocarpon* conidia are associated with dark, usually vinaceous brown perithecia arising from compacted, thickened, pigmented cells of the outer wall, but otherwise characteristic of the genus as defined by the type, *N. cinna-barina*.

CUNNINGHAM (G. H.). **Thelephoraceae of New Zealand—Part XII—The genera Thelephora and Tomentella. Part XIII—The genus Coniophora.**—*Trans. roy. Soc. N.Z.*, 84, 3, pp. 479–496, 7 figs., 1957.

In continuation of his studies [cf. 36, p. 555] the author gives descriptions of two new Zealand species of *Thelephora* and four of *Tomentella*. *Thelephora terrestris* is not parasitic but may kill pine seedlings by growing round the stems and smothering them.

Six species of *Coniophora* are known from the Dominion, two of which, *C. dimittica* and *C. minor*, are new. A key is provided to this genus.

MALENÇON (G.). **Prodrome d'une flore mycologique du Moyen-Atlas. 3^e Contribution.** [Prodrome of a mycological flora of the Middle Atlas. Third contribution.]—*Bull. Soc. mycol. Fr.*, 71, 4, pp. 265–311, 8 pl., 9 figs., 1955. [Received 1956.]

This contribution [cf. 35, p. 236] deals with the Polyporaceae of the Middle Atlas region of Morocco, mostly on dead timber. *Phaeolus* [*Polyporus*] *schweinitzii* [map 182] was found twice on cedar and frequently on dead *Pinus insignis* (in the Tangier region); *Ungulina* [*Fomes*] *officinalis* and *Xanthocrous* [F.] *pini* var. *abietis* parasitize cedars; *Gloeoporus* [*Polyporus*] *dichrous*, X. [F.] *ribis*, *Trametes extenuata*, *T. campestris*, *Poria europa*, and *P. gilvescens* were found on cork oak (*Quercus suber*). One new species is described.

BOURIQUET (G.) & AUGÉ (G.). **Quelques champignons parasites de plantes cultivées nouveaux pour Madagascar et l'Archipel des Comores.** [Some fungi new to Madagascar and the Comoro Islands parasitic on cultivated plants.]—*Agron. trop.*, *Nogent*, 12, 3, pp. 307–311, 1 pl., 4 figs., 1957.

Descriptions and distribution are given of five fungi new to Madagascar and the Comoro Islands. *Cordana musae* [map 177] was found on banana leaves at Antalaha in November, 1954, and *Macrophoma ensetes* [17, p. 97] on a green banana picked at Antananarivo in July, 1943; the pycnidia measured 120 to 150 by 120 to 170 μ , and the spores 13 to 21 by 4 to 6.5 μ . It is usually saprophytic or a parasite of wounded fruits. *Pestalotia theae* [cf. 30, p. 196; 31, p. 33; 35, p. 509, *et passim*] occurred on the leaves of isolated tea plants in a garden on Anjouan Island in November, 1954; *Phakopsora desmrium* [cf. 35, p. 879] on leaves of *Gossypium punctatum* in southern Madagascar in 1947; and *Sphaerella rosigena* var. *comoriensis* n. var. [without a Latin diagnosis] caused angular, bordered spots on rose leaves [cf. 27, p. 81] at Anjouan in October, 1952; the perithecia measured 70 to 90 by 60 to 81 μ , the asci 36 to 60 by 4.8 to 9 μ , and the fusiform spores 8.5 to 12 by 2.5 to 3 μ .

SUN (S.-H.). **Studies on the genus Cercospora found in Taiwan. (1).**—Reprinted from *J. Agric. For.*, 9, 49 pp., 31 figs., 1955. [Chinese, with English summary. Received 1957.]

Among the 31 species of *Cercospora* occurring in Formosa are six new ones, including *C. dalbergiae* on *Dalbergia sissoo*, *C. hibisci-mutabilis* on *Hibiscus mutabilis*, *C. rubro-purpurea* and *C. saccharicola* on sugar-cane, causing purple spot and ring spot, respectively. The eight new records include *C. sorghi* [map 338] on sorghum.

KARLING (J. S.). **New and unidentified species of Synchronium. II.**—*Bull. Torrey bot. Cl.*, 83, 6, pp. 415–420, 1956.

Descriptions are given (from herbarium material) of two new species of *Synchronium* [cf. 35, p. 849], *S. variabilum* on *Ranunculus occidentalis* and *S. parksii* on *Trifolium microdon*, and of two unidentified species, one on *Trifolium* sp. and *T. dichotomum*, the other on *T. involucreatum*, all from California.

BRILLOVÁ-SUCHÁ (DOROTA). **Hrdze a sněti Čergovského pohoria a okolia Prešova.**

[Rusts and smuts in the Čergov mountain range and the environs of Prešov.]—

Biológia, Bratislava, 10, pp. 541–554, 1955. [Russian and German summaries.

Abs. in *Zbl. Bakt.*, Abt. 2, 110, 11–15, p. 442, 1957.]

The first part of this study is concerned with the ecological value and biological properties of *Puccinia bromina* on *Symphytum cordatum* (a new host) and of *Trachysphaera alchemillae* on *Alchemilla pratensis*. The second part comprises a list of the rusts and smuts collected in the Čergov mountain range and the environs of Prešov, Czechoslovakia. *Deschampsia caespitosa* and *Milium effusum* are listed as new hosts for *P. coronata* and *P. glumarum*, respectively.

BILAI (V. I.). **Фузарии (биология и систематика).** [The Fusaria (biology and systematics).]—319 pp., 51 figs., Ukrainian S.S.R. Academy of Sciences Publisher, Kiev, 1955. Roubles 17.45.

In this fully illustrated monograph a critical analysis is presented of the existing systematic classifications of the genus *Fusarium* [31, p. 148] and a new one, based on many years of study on the physiology and variability of some 1,100 different cultures of *Fusarium* isolated from different substrata and geographical regions, is suggested. The genus is represented here by nine sections, 26 species, and 29 varieties.

In chapter I the biological and ecological characteristics and the differences in morphological, physical, and biochemical properties are discussed (pp. 36–81). Experiments showed that species of the sections *Discolor* and *Gibbosum* were alike in requiring potassium in the substratum. However *F. avenaceum*, *F. oxysporum* var. *orthoceras* n. comb., and *F. solani* grew, though less rapidly, on potassium-free media and formed normal mycelium and spores. In the *Elegans* section, *F. vasinfectum*, *F. udum*, and *Gibberella fujikuroi* reacted identically to zinc, boron, and manganese. Most of the species grew better on media containing mannitol, *F. solani* on that containing saccharose, and *F. avenaceum* on that with starch. Starch decomposition by *F. solani* and *F. culmorum* occurred at an earlier stage of growth in culture and was more rapid than with the other species studied. Tryptophane, cystine, cysteine, arginine, and histidine were used chiefly by the species of the *Elegans*, *Liseola*, and *Martiella* sections. Species in the other sections, particularly *Roseum*, *Gibbosum*, and *Sporotrichiella*, hardly grew in media containing these amino acids as sources of nitrogen. Those in *Sporotrichiella* were unable to assimilate lycine, but used nitrogen from different combinations of albumen, amino acids, nitrates, ammoniacal salts, nitrites, and gaseous ammonia.

In chapter II (pp. 82–109), on the parasitic and symbiotic properties of *Fusarium* spp., a table, based on the literature, is given of hosts with the *Fusarium* diseases occurring on them. None of the most widespread species is markedly parasitic to its hosts; those known to be parasitic on certain plants are few in number. Inoculating seed and soil with cultures of some species stimulated the growth and yield of the plants.

In chapter III (pp. 110–131) the problem of differentiating morphological characters, including those of the perfect states, is surveyed. Individual differences in growth changes and the form of conidial germination, characteristic of certain

species, were noticed. Thus the macroconidial end cells of *F. culmorum* lost their activity, while those in *Martiella* and *Elegans* germinated. Differences in the structure of conidial contents were apparent in the different species depending on their age.

Chapter IV (pp. 132–148) deals with basic methods for study and identification, pure, but not monospore, cultures being regarded as the most suitable. The media recommended for this purpose are must agar and the new cellulose-containing media, acid must agar being used for initial isolations. The characteristic physiological symptoms, such as toxicity to animals and pathogenicity to individual plants, are described and isolation methods given.

Experimental and critical evaluation of the division of the genus into sections is given in chapter V (pp. 149–252), the following sections being emended: *Roseum* (syn. *Arthrosporiella* pr. p.), *Discolor* (syn. *Gibbosum*, *Lateritium*, and *Trichothecioides*), *Eupionnotes* (syn. *Submicrocera* and *Pseudomicrocera*), *Elegans* (syn. *Liseola*), and *Martiella* (syn. *Ventricosum* and *Eupionnotes* pr. p.).

Keys to the sections and to the species, with full descriptions of the latter, are provided in chapter VI (pp. 253–295), which includes one new species, *F. sporotrichiella* with its new varieties *poae* (syn. *F. poae*), *sporotrichioides* (syn. *F. sporotrichioides*), *tricinctum* (syn. *F. tricinctum*), and *anthophilum* (syn. *F. anthophilum*), 15 new combinations (including *F. solani* var. *coeruleum* for *F. coeruleum* and *F. s. var. redolens* for *F. redolens*), and one new name, *F. microcera* (syn. *F. ciliatum* and *F. juruanum*) [all the nova being without Latin diagnoses].

Snyder and Hansen's emendation of *F. oxysporum* is accepted, except that one variety (*F. oxysporum* var. *orthoceras* n. comb. for *F. orthoceras*) is accepted. Indexes of Latin binomials of the fungi and hosts and the Russian names of the higher plants mentioned in the text and a bibliography (pp. 296–307) are appended.

RACOVITĂ (A.). **Dezinfectarea termică pe cale uscată a semințelor de Tutun.** [Hot air treatment of Tobacco seeds.]—*Lucr. Inst. Cer. aliment., București*, 1, pp. 175–188, 1 diag., 1957. [Russian and French summaries.]

As a result of experiments carried out in Romania hot air treatment at 85° to 90° C. for an hour is recommended for the disinfection of tobacco seed. Apparatus with a capacity of 20 kg., sufficient for the treatment of 300 to 400 kg. of seeds, is described. The treatment increased production by 10 per cent. and greatly improved the quality of the tobacco.

CIFERRI (R.). **La lotta contro l'oidio del Tabacco con il karathane.** [The control of powdery mildew of Tobacco with karathane.]—*Tabacco, Roma*, 61, 682, pp. 3–9, 1957. [English summary.]

In a spraying test at Pavia University, Italy, three applications of karathane 0.08 per cent. gave 100 per cent. control of powdery mildew (*Oidium tabaci*) [*Erysiphe cichoracearum*: cf. 34, p. 491 *et passim*] on Xanthi Yakà tobacco plants growing in a greenhouse. Three applications at 0.1 per cent. gave 98 per cent. control. Four weeks after treatment the index of control (D) [29, p. 59] was 57 and 65 per cent. for karathane at 0.08 and 1 per cent., respectively, and there was some residual effect.

HITIER (H.) & IZARD (C.). **Recherches sur les moyens de lutte contre le feu sauvage du Tabac (*Pseudomonas tabaci*).** [Researches on the means of controlling Tobacco wildfire (*Pseudomonas tabacum*).]—*Ann. Inst. exp. Tab. Bergerac*, 2, 2, pp. 43–54, 1955. [Received May, 1957.]

In spraying tests during 1953–4 at the Tobacco Experimental Institute, Bergerac, France, satisfactory control of wildfire (*Pseudomonas tabacum*) on Paraguay Dordogne tobacco seedlings was given by streptomycin sulphate [cf. 36, pp. 137,

282] at a dilution of 10^{-3} , though phytotoxic effects were sometimes apparent. This strength may be used during severe epidemics, but in most cases one of 10^{-4} would appear to be sufficient. In wet weather applications should be made at weekly intervals.

GIGANTE (R.). **La bruciatura o fuoco selvaggio del Tabacco.** [Burning or wildfire of Tobacco.]-*Tabacco, Roma*, 61, 682, pp. 10-19, 3 figs., 1957. [English summary.]

A brief account is given of the symptoms of tobacco wildfire (*Pseudomonas tabacum*), factors affecting it, and its control [cf. 31, p. 90, *et passim*].

CRUICKSHANK (I. A. M.) & MÜLLER (K. O.). **Water-relations and sporulation of *Peronospora tabacina* Adam.**-*Nature, Lond.*, 180, 4575, pp. 44-45, 1 fig., 1 graph, 1957.

At the Division of Plant Industry, Canberra, 15 mm. diameter disks from physiologically similar tobacco leaves inoculated with *Peronospora tabacina* were floated, ventral side uppermost, on mannitol solutions in perspex cells standing in a glycerol-water solution in sealed Petri dishes and incubated at 21°C . in alternating light and dark, 12 hr. each.

The intensity of sporulation was significantly reduced by a relative humidity of less than 97 per cent. or a diffusion pressure deficit greater than 3 to 4 atmospheres under otherwise favourable conditions of light and temperature.

WELSH (R. S.). **Studies on the aggregation reactions and basic dye binding of Tobacco mosaic virus. I. Variation of pH, particle asymmetry, acid and base titration results, irreversible binding of methylene blue, ultraviolet absorption, and extent of heat denaturation in Tobacco mosaic virus solutions with time of standing.**-*J. gen. Physiol.*, 39, 3, pp. 437-471, 10 graphs, 1956.

In studies at the Department of Chemistry, Stanford University, [California], it was found that aqueous solutions of tobacco mosaic virus underwent spontaneous changes on standing in the cold. At first hydrogen ions were released and the lability of the nucleic acid increased, and then after eight days an end-to-end dimerization occurred which required hydrogen ions.

The first reaction was a mixture of reversible disaggregation and aggregation reactions depending on the pre-treatment, the tobacco mosaic virus concentration, the time of standing, and the phosphate concentration. The average number of hydrogen ions taken up by a tobacco mosaic virus monomer in the formation of an end-to-end dimer was 3,300.

The polymeric form of methylene blue caused complete irreversible conversion of monomers to end-to-end dimers [36, p. 280] and higher polymers were formed at dye concentrations above 10^{-4} M. The maximum binding ratio for tetrameric binding was calculated to be 6,465 and for dimeric binding 3,230.

WANG (T.-Y.) & COMMONER (B.). **The formation of infectious nucleoprotein from Tobacco mosaic virus protein and Tobacco leaf DNA.**-*Proc. nat. Acad. Sci. Wash.*, 42, 11, pp. 831-841, 1 fig., 2 graphs, 1956.

At the Henry Shaw School of Botany, Washington University, St. Louis, Missouri, a nucleoprotein complex was formed from concentrated solutions of desoxyribonucleic acid (DNA) prepared from healthy tobacco leaves with either tobacco mosaic virus protein [36, p. 133] or B3 protein [36, p. 66] from tobacco plants infected with tobacco mosaic virus. From these mixtures nucleoproteins were formed, consisting of rods similar to those of tobacco mosaic virus but containing a higher proportion of unusually long rods. These reconstituted nucleoproteins were consistently more infective than either of the starting materials

[cf. 36, p. 134]. Ribonuclease had no effect on the reconstitution process when DNA was used but the resulting infectivity was considerably reduced by treatment with desoxyribonuclease. The reconstituted nucleoproteins were not self-duplicating; after one transfer in *Nicotiana glutinosa* the virus produced was biologically identical with tobacco mosaic virus and had the same ribonucleic acid content. Lesions produced by comparable amounts of DNA-bearing nucleoprotein were considerably greater in number than those produced by ordinary tobacco mosaic virus, but secondary lesions produced by transfer from primary ones were similar in number.

Possibilities suggested to explain the infectivity of the reconstituted material are that it may be due to either the presence of extremely minute amounts of virus ribonucleic acid which present-day chemical methods are not sensitive enough to rule out, or the ability of the protein to acquire from the polymers of tobacco mosaic virus the biological specificity of the virus.

HIRTH (L.) & STOLKOWSKI (J.). **Action de la cortisone sur la multiplication du virus de la mosaïque du Tabac.** [Action of cortisone on the multiplication of the Tobacco mosaic virus.]—*C. R. Acad. Sci., Paris*, 245, 1, pp. 119–122, 1 graph, 1957.

Activation of the multiplication of tobacco mosaic virus [cf. 35, p. 331] under the influence of cortisone at a concentration of 3.5 mg. per ml. was observed in recent studies on P 19 and White Burley tobacco leaf disks immersed in Knop's solution (with or without glucose) for six to eight days during the short days of October and more especially of November and December. On the contrary, in experiments performed during the long daylight of the spring and summer months the influence of the hormone on virus multiplication was inhibitory.

OWEN (P. C.). **The effect of infection with Tobacco etch virus on the rates of respiration and photosynthesis of Tobacco leaves.**—*Ann. appl. Biol.*, 45, 2, pp. 327–331, 1957.

At Rothamsted Experimental Station, leaves of White Burley tobacco were inoculated with a virulent strain of tobacco etch virus [cf. 36, p. 137]. There was no effect for 20 hours, nor was there any seasonal effect [cf. 35, p. 128]. After six days, when etch symptoms appeared, respiration rates rose to almost 30 per cent. above those of healthy leaves and then continued to be higher until the leaves died. Three or four weeks after inoculation the infected leaves had a respiration rate 40 per cent. above that of the uninfected. Infected leaves showing symptoms had a photosynthetic rate 20 per cent. below that of healthy leaves. The average decrease in assimilated carbon dioxide was approximately 2.5 mgm. per hour per leaf and the average increase in respired carbon dioxide was approximately 0.3 mgm. per leaf. The reduction in dry matter brought about by the above phenomena probably accounts for the severe effects of the etch virus on the growth of tobacco.

ŠUTIĆ (D.). **Bakterioze Crvenog Patlidžana.** [Tomato bacteriosis.]—*Posebna Izd. Inst. Zasht. Bilja, Beograd* [Spec. Edit. Inst. Plant Prot., Beograd] 6, 65 pp., 19 figs., 1957. [English summary.]

Among the bacterial diseases of tomatoes recorded in Yugoslavia during a survey in 1951–5 were *Pseudomonas* [*Xanthomonas*] *vesicatoria* [map 269], *P. tomato* [cf. 31, p. 36], both very widespread and harmful, *Corynebacterium michiganense* [map 26], *P. gardeneri* n. sp., and *P. g.* var. *capsici* n. var. *P. gardeneri* produces on the fruits spots and scabs surrounded by a white halo similar to the bird's eye spot previously described [3, p. 119]. The bacterium is rod-shaped, 0.98 to 1.96 by

0.56 to 0.7 μ , and differs from *X. vesicatoria* in growing in Cohn's solution, liquifying gelatine with the development of a yellowish golden colour, and failing to acidify maltose, starch, dextrin, and mannite. It is also pathogenic to chilli pepper (*Capsicum annuum*). *P. g. var. capsici*, isolated from chilli and pathogenic to tomato on inoculation, differs from the species in that it does not produce a white halo round the spots on tomato fruits, it forms acid from dextrin, maltose, and arabinose, colonies on nutrient agar are pale yellow, and it is less virulent on tomato and chilli in experimental inoculations.

Control of these two diseases depends on sowing clean, healthy seed. A study of varietal resistance is recommended.

STRONG (M. C.). New fungicides and fungicide combinations for Tomatoes.—*Quart. Bull. Mich. agric. Exp. Sta.*, 39, 4, pp. 563–569, 2 pl., 1957.

In further fungicide tests at the Michigan Agricultural Experiment Station, East Lansing [cf. 35, p. 244], in 1955–6, combinations of ziram or zineb with fixed copper, each at one-half the recommended concentration, continued to give good control of anthracnose [*Colletotrichum phomoides*: 36, p. 284], early blight [*Alternaria solani*: loc. cit.], and *Septoria* blight [*S. lycopersici*: 35, p. 244] on Rutgers tomatoes. Against late blight [*Phytophthora infestans*: 36, pp. 285, 431] the copper constituent of the spray should be raised to the concentration usually recommended (2 lb. metallic copper per 100 gals.). Experiments with dithane He-177 indicated that copper ethylenebisdithiocarbamate, if it could be easily manufactured, might prove the most effective fungicide for the control of tomato diseases. The maneb formulations tennam 5, tennam 7, and manzate are also recommended.

PELLETIER (E. N.). The value of field application of fungicides for reduction of post-harvest Tomato anthracnose losses.—*Diss. Abstr.*, 16, 11, p. 1990, 1956.

Four aspects of the chemical control of tomato anthracnose [*Colletotrichum phomoides*: 36, p. 284] were investigated at Purdue University [Lafayette, Indiana], namely, the control of post-harvest breakdown by standard fungicides, a bioassay of fungicides *in vitro* against *C. phomoides*, subsequent field evaluation of materials selected in laboratory tests, and the effect of temperature on fungicide stability.

For three years fruit from field spray trials was stored at 45° F. for the optimum development of *C. phomoides*. The least spoilage followed weekly treatments of manzate or a mixture of tri-basic copper and ziram. Low-soluble coppers gave poor control. An increase in time between the final spray application and harvest increased the incidence of anthracnose. A delay in lesion development which is important in storage control indicated a possible systemic action, ethylenebisdithiocarbamates being more effective in this respect than dimethyldithiocarbamates.

In laboratory bioassays a number of chemicals and antibiotics were found to be more effective than the standard fungicides but field efficiency was not always correlated with effectiveness in the laboratory. High temperatures were partly responsible for reduced efficiency in the field, for example seven days at 97° F. reduced fungicidal activity by factors ranging from 0 to eight.

WILLIAMS (P. H.) & HACK (JUDITH). The effect of certain soil treatments on Didymella stem rot of Tomatoes. Part I. Glasshouse experiments.—*Ann. appl. Biol.*, 45, 2, pp. 304–311, 1 graph, 1957.

This paper from the Glasshouse Crops Research Institute, Littlehampton, Sussex, gives a more detailed account of experiments at Cheshunt on the inter-relationship of soil sterilization and infection of Potentate tomatoes with *Didymella lycopersici* already noticed [35, pp. 655–656]. Steamed soil remained susceptible to infection by *D. lycopersici* for at least four months (the maximum period that could be tested). The fungus can survive in contaminated soil for four to

seven months after removal of the plants [cf. 35, p. 243], though burying contaminated surface soil in the course of cultivation may lessen infection.

Under glass, the peak of infection occurred in May. There was a correlation between the amount of disease present and the yield; not until plant losses reached 50 per cent. did loss of yield exceed 20 per cent., and in one case 85 per cent. loss of plants only resulted in 19 per cent. loss of yield. With severe infection yield varies in accordance with the amount of fruit that can still be removed and ripened after it takes place, and with the possibility of replacing affected plants by shoots from neighbours.

GÄUMANN (E.). **Über Fusarinsäure als Welketoxin.** [On fusarinic acid as a wilt toxin.]—*Phytopath. Z.*, 29, 1, pp. 1–44, 3 figs., 14 graphs, 1957.

This is a detailed review and discussion of fusarinic acid in relation to certain wilt diseases of plants with special reference to *Fusarium* [*bulbigenum* var.] *lycopersici* on tomato [35, p. 927; 36, pp. 201, 503]. Many of the papers in the four-page bibliography have been noticed from time to time in this *Review*. Venkata Ram reports (*in litt.*) from Madras that the acid was detected in *F. orthoceras*, the cosmopolitan agent of a vascular bundle and wilt disease of peas, potatoes, etc.

RADEMACHER (B.) & AMANN (M.). **Kommt das Stolburvirus auch in Deutschland vor?** [Does stolbur virus also occur in Germany?]*—NachrBl. dtsh. PflSch-Dienst (Braunschweig), Stuttgart*, 9, 7, pp. 97–99, 3 figs., 1957.

The occurrence of tomato stolbur virus is stated to be still unconfirmed in Germany [35, p. 541].

CANOVA (A.). **Ricerche intorno ad una virosi del Pomodoro (mal della striscia).**

II. Presenza del virus sui semi e nel terreno. [Studies on a virus of the Tomato (streak disease). II. Presence of the virus on the seeds and in the soil.]—*Phytopath. Z.*, 28, 4, pp. 415–422, 1957. [English and German summaries.]

Evidence is presented that the strain of tobacco mosaic virus responsible for tomato streak disease in the Marches region of Italy [see below, p. 752] is transmissible through the seed. The incidence of infection may be reduced by two hours' washing of the seeds in running water or fermentation of the fruits before extraction of the seeds. The virus was completely destroyed without reduction of germination by 24 hours' immersion of the seeds in 6 per cent. hydrochloric acid. These results are considered to prove that the infectivity of the seeds is caused by the presence of the virus on their surface. The soil of seed-beds and fields was also found to harbour the virus.

DOERING (G. R.), PRICE (W. C.), & FENNE (J. B.). **Tomato rosette caused by a virus complex.**—*Phytopathology*, 47, 5, pp. 310–311, 1 fig., 1957.

Observations at the University of Pittsburgh and the Virginian Polytechnic Institute showed that tomato rosette disease [31, p. 302] is not, in fact, due to a single strain of tobacco mosaic virus, but to the tomato rosette strain in combination with an unstable virus referred to as the shoestring virus. The former is differentiated from other mild strains by the pH of maximum optical density [33, p. 386] and serologically [32, p. 699]. If infectious sap be left at laboratory temperature for a few hours the second virus is inactivated. Alternatively, the rosette strain of tobacco mosaic virus can be localized in *Nicotiana glutinosa*, whereas the shoestring virus becomes systemic and can be separated.

The shoestring virus in tomato causes mild mottling and slight undercurling of leaves, in tobacco, chlorotic ring spots, fine mottling, and bronzing of leaves, and in *N. rusticana* and *N. sylvestris* vein clearing and vein banding. The virus was recoverable from infected tomato and tobacco plants in the greenhouse only during

cool weather, but though not transferable mechanically in warm weather, if inoculated into plants in cool months it was carried by them through the summer and was transmissible from them again in autumn. This inactivity explains the varying symptoms previously reported for the tomato rosette disease.

Shoestring and rosette introduced into tobacco together, and also shoestring with other tobacco mosaic virus strains, particularly Holmes' ribgrass strain, cause marked stunting and production of strap leaves with little or no blades. A combination of shoestring and cucumber mosaic virus produced similar but less marked symptoms in tomato.

SELMAN (I. W.) & GRANT (SHEILA A.). **The influence of temperature and daylength on spotted wilt virus disease of Tomato.**—*Ann. appl. Biol.*, 45, 2, pp. 312–317, 1 graph, 1957.

In experiments at Wye College, near Ashford, Kent, Potentate tomato seedlings grown in nutrient solutions were inoculated with spotted wilt virus, kept at 11.4°, 18.3°, 23.9°, and 29.4° C., and given photo-periods of 15, 12, and 9 hours at each temperature. In one experiment, a light period of 15 hours was used to measure the incubation period at 12.8°.

The results showed that daylength did not affect the incubation period but that its duration was positively correlated with temperature, the relationship being represented by the regression equation $1/y = 0.0112x - 0.075$, where y = incubation period in days and x = temperature in °C. The calculated temperature at which this period becomes infinite is 6.7°. The temperature coefficient (Q10) ranged from 1.7 to 2.9.

The best growth of healthy plants was obtained at 18.3° with 15 hours daylength. The effect of increasing daylength on plant dry weight was most marked at the higher temperatures. Infection invariably increased the percentage of dry matter in all parts of the plant. In healthy plants the leaf to stem ratio decreased with increasing temperature. Infection decreased this ratio at the lower temperatures and increased it at the higher, indicating that the plant part maintaining the relatively higher growth rate with change of temperature suffered the greatest check on becoming infected; a similar conclusion can be drawn from an examination of the shoot to root ratios. In healthy plants receiving days of 12 or 15 hours, the ratio tended to rise with increased temperature, whereas in infected plants it was greater than in the controls at low temperatures, but less at high. Infection therefore appeared to interfere with carbohydrate metabolism.

In all experiments, vein intensification in the youngest leaves was the first symptom, followed immediately by leaf epinasty and a hitherto unreported nastic curvature of the stem. The systemic symptoms in plants raised at the four different temperatures are described. They were unaffected by daylength. With a nine-hour day at 29.4° the virus content of the sap was significantly lower than with 12 or 15 hours, and with a 12-hour day it was significantly higher than with a 15-hour day.

BART (G. J.). **Host-parasite relationships of the Oak wilt fungus.**—*Diss. Abstr.*, 16, 11, pp. 2008–2009, 1956.

At Ohio State University, three- to five-year-old trees of 17 species native to the State were inoculated with *Endoconidiophora fagacearum* [*Chalara quercina*: 35, pp. 284, 403]. Slightly susceptible trees included dogwood [*Cornus* sp.], hickory, hop-hornbeam [*Ostrya virginiana*], sassafras, and wild cherry, while oak, chestnut, and the apple varieties Jonathan and Delicious were susceptible. The susceptibility of *Malus* and its relatives needs further investigation.

Inoculation experiments on oak seedlings in high humidity chambers suggested that leaf discoloration was attributable to another factor apart from mechanical

plugging of the xylem vessels. The transpiration loss from inoculated trees was heavier for the first 16 days after inoculation than from healthy trees, then the situation was reversed. The development of tyloses and some additional mechanism affected the rate of water loss.

In diseased, living oaks *C. quercina* was found in the xylem of root, stem, petiole, and leaf blade but not in the phloem. The pathogen grows more abundantly in the phloem and cambium of cut stems than in the xylem, and following the death of the host grows into the phloem.

Oak wilt symptoms on inoculated trees nearly always occurred on the same side of the tree as the inoculation site, indicating that in the early stages lateral spread of *C. quercina* is rather limited.

POTTER (H. S.). **The use of chemicals to suppress symptoms of Dutch Elm disease in two-year-old American Elm trees inoculated with *Ceratostomella ulmi* (Schwarz) Buisman.**—*Diss. Abstr.*, 16, 12, p. 2292, 1956.

Experiments were made at the University of Maryland to examine the suitability of young American elm trees for determining (a) the phytotoxicity of compounds selected as possible therapeutants for Dutch elm disease (*Ceratostomella* [*Ceratomyces*] *ulmi*), and (b) the effectiveness of selected fungicides in suppressing the symptoms of the disease (in inoculated young trees).

A number of compounds, active *in vitro* against the fungus, were first tested for phytotoxicity, the antibiotics being applied as foliar sprays and the other compounds as nutrient solutions to the roots in sand cultures. Puratized agricultural spray and actidione were the most toxic; OQB (8-hydroxy-quinoline benzoate) and other antibiotics were toxic only at comparatively high concentrations. HD-109 (potassium salt of 2-carboxymethyl mercaptobenzothiazole) and HD-160 [35, p. 31] produced malformations of the leaves at concentrations over 20 p.p.m., as did also actidione at 10 to 20 p.p.m.

Two- to three-year-old trees were equally susceptible to inoculation, and more so than one-year-old trees.

The fungicides were applied in nutrient solution to the roots of two-year-old trees growing in gravel in the greenhouse, and a semi-quantitative method was devised for evaluating the severity of infection in terms of vascular discoloration and the extent of wilting. HD-109 (10 p.p.m.), HD-160 (10 p.p.m.), puratized agricultural spray (5 p.p.m.), and vancide 51 (20 p.p.m.) effectively suppressed the development of symptoms. OQB (250 p.p.m.) had only a temporary effect, and AC-12046 (40 p.p.m.) and nabam were highly toxic. None of the antibiotics, applied as foliage sprays, was effective. It was possible to isolate *C. ulmi* from discoloured wood in the inoculated trees, irrespective of treatment, but not from non-discoloured wood.

It is concluded that young American elms are suitable for this work.

BRAUN (H.) & HUBBES (M.). **Sporeninfektion und Antagonismus bei *Dothichiza populea*.** [Spore infection and antagonism in *Dothichiza populea*.]—*Naturwissenschaften*, 44, 11, p. 333, 1 fig., 1957.

Experiments with robusta poplars at the Institute for Plant Diseases, University of Bonn, revealed that infection by *Dothichiza populea* [36, p. 289] is connected with wound callous formation, which only takes place at temperatures above 12° C., infection of wounded plants being obtainable only below this temperature. Plants were grown at 16° and 80 per cent. relative humidity, with artificial lighting, and then placed at 3° 14 days before infection. During this period shoot growth ceased. They were inoculated by spraying with a spore suspension, temperature being raised to 16° and humidity to 98 per cent. and reduced after 20 hours to 12° and 70 per cent., respectively. Of 28 shoots 20 became infected. It is concluded that *D.*

populea can penetrate the plant via shoot tips and buds, and these results were confirmed in the field.

In culture filtrates of *D. populea* young poplar shoots dropped all their leaves after 60 hours. The fungus discoloured liquid culture media (poplar bark extract) during its growth, individual strains being clearly distinguishable in the extent of the discoloration (yellow to dark brown).

PESANTE (A.). **Seccume di Pioppi in vivaio.** [A wilt of Poplars in the nursery].—*Notiz. Malatt. Piante*, 39 (N.S. 18), pp. 65–66, 1957.

In September, 1954, poplar seedlings growing in nurseries near Turin, Italy, became affected by an apical wilt. In one nursery 250 of 40,000 young trees were attacked within a few days; spread then declined, and after a few weeks the disease became arrested. Depressed, sepia stripes of various widths appeared on the stems, widened, and turned grey-black. The young leaves in the affected part developed a black line along the petiole and withered. Bacterial colonies obtained from the bark proved non-pathogenic. Further investigation is in progress.

DOCHINGER (L. S.). **A study of the Verticillium wilt disease of Maple trees.**—*Diss. Abstr.*, 16, 12, p. 2262, 1956.

Much of the information in this paper from Rutgers University has already been published [36, p. 361]. *In vitro*, *Verticillium albo-atrum* from diseased maples [*Acer* spp.] utilized most sources of nitrogen; absence of light encouraged the development of microsclerotia. A method is proposed whereby the potency of the toxin is measured by its effect on the roots of cucumber seedlings.

Movement of the fungus was curtailed in defoliated plants. With increasing nitrogen levels there was stronger callus formation round the wound in diseased plants and an increase in the upward movement of the fungus. Tree injection techniques [35, p. 646] showed that the liquid intake from 4-in. borings was twice as great as from 2-in. There was no difference in uptake between borings at ground level and at 4 ft. By this means injection was possible from late April until the onset of frost. A formula for dosage was worked out on the basis of the height and circumference of the tree.

GIBSON (I. A. S.). **Saprophytic fungi as destroyers of germinating Pine seeds.**—*E. Afr. agric. J.*, 22, 4, pp. 203–206, 1957.

Experiments at the Forest Department, Kenya, showed that pierced seeds of *Pinus patula* became colonized by saprophytic fungi. Germination of untreated seed after 15 days on agar at 26° C. was 76.4 per cent., as against 71.6 per cent. for sterilized seeds and 64.5 per cent. for sterilized, needle-pierced seeds. The same species of fungi occurred with approximately the same frequency on the sound and the pierced seeds: *Rhizopus arrhizus*, *Mucor hiemalis*, *Trichoderma koeningii* [*T. viride*], *Cladosporium* sp., *Aspergillus tamarisii* [cf. 34, p. 588], and *Chaetomium cochlioides*.

The more rapidly growing isolates were those most likely to invade the pierced seed, susceptibility declining as germination proceeded. A high proportion of damaged seeds did not affect the rate of germination of sound seeds in the same lot. The conclusion that fungi harmless on the surface of pine seeds can become destructive once the seed coat has become even slightly damaged may explain the failure of germination associated with mechanical de-winging.

LINDGREN (R. M.) & ERICKSON (E. C. O.). **Decay and toughness losses in Southern Pine infected by Peniophora.**—*For. Prod. J.*, 7, 6, pp. 201–204, 1 fig., 1 diag., 1957.

In studies at the Forest Products Laboratory, Madison, Wisconsin, peeled pine

bolts, 5 ft. long and 8 to 11 in. in diameter, which had been stored for periods of six to 13 weeks at the Harrison Experimental Farm, Mississippi, were used as test material to determine decay and toughness losses in longleaf pine [*Pinus palustris*] exposed to natural infection by *Peniophora* sp. Attempts to isolate pure cultures from the stored material were unsuccessful owing to contaminating organisms, but the appearance of the infected wood, and the mycelial growth from infected areas in wood incubated in moist chambers, indicated that decay was caused mainly by *P. gigantea* [35, p. 858]. An average of 31 per cent. of bolts stored for six weeks showed decay characterized by scattered yellowish patches. There was no perceptible softening of the wood in infected areas, and loss of specific gravity averaged less than 1 per cent. Five to 25 per cent. of the cross-sectional area was also discoloured by [unspecified] blue stain fungi. Bolts stored for 13 weeks showed an average of 62 per cent. decay, perceptibly softened wood occurring in all bolts except one. Specific gravity losses averaged 3.5 per cent. and blue stain discoloration varied from 5 to 60 per cent.

Toughness losses in bolts stored for 6, 10, and 13 weeks averaged 16, 27, and 33 per cent., respectively.

WATERMAN (ALMA M.) & HANSBROUGH (J. R.). Microscopical rating of decay in Sitka spruce and its relation to toughness.—*For. Prod. J.*, 7, 2, pp. 77–84, 9 diagrams, 1957.

In studies by the United States Department of Agriculture on the possible correlation of toughness reduction in Sitka spruce trees to microscopical changes in the wood, the progress of decay was examined in spruce blocks infected with brown rot (*Poria monticola* [35, p. 337], *Trametes serialis* [35, p. 252], *Polyporus schweinitzii* [30, p. 88], *P. sulphureus* [loc. cit.], and *Lentinus kaufmannii* [36, p. 291]), and white rot (*Fomes pini* [34, p. 819], *Poria subacida* [33, p. 60], and *Polyporus borealis* [27, p. 547]). Brown rot decay was indicated by increased production of bore holes affording access to the tracheid walls and by slight separation of the adjacent tracheids, while the white rot fungi caused lignin decomposition and thinning of the tracheid walls, particularly in cross sections.

The presence of hyphae and bore holes and decomposition of cell walls in individual tracheids was used to establish a numerical decay rating scale of 0 to 8, and the relation between decay and toughness was determined by making parallel ratings of test strips from two 12-ft. flitches naturally infected with *Poria monticola*. Results indicated that in decay ratings of 2 or under, reduction in toughness was insignificant.

JAMALAINEN (E. A.). A test on the control of black snow mould (*Herpotrichia nigra* Hartig) in Spruce seedlings by the use of pentachloronitrobenzene.—*Valt. Maatalousk. Julk.* 148, pp. 68–72, 1 fig., 1956. [Finnish summary.]

At a nursery at Iisalmi, Finland, infection of one-year-old spruces by *Herpotrichia nigra* [36, p. 7] was reduced from an average of 8.17 to 0.17 per cent. by dusting the soil with 20 per cent. PCNB (botrilex) at a dosage of 250 gm. per are [119.6 sq. yds.] in mid-November, 1954. In a comparative test with mercuric chloride (200 gm.) the young plants sustained heavy damage from the treatment.

BAECHLER (R. H.). Microbiological process report. Newer preservative treatments for wood.—*Appl. Microbiol.*, 4, 5, pp. 229–232, 1956.

The author discusses the double diffusion timber preservation process developed at the Forest Products Laboratory, Madison, Wisconsin [21, p. 107]. Of 100 pine posts [cf. 34, p. 828; 35, p. 567] treated in 1941 by immersion in copper sulphate followed by sodium arsenate only one has failed, and there were no failures in 30 pine stakes treated in 1942. One failure occurred in 40 stakes protected by copper

chromate. Sodium arsenate is not recommended for farms, but arsenic acid in copper sulphate (1 in 5) may be substituted. The corrosive nature of copper sulphate, which diffuses along poles more rapidly than other salts, calls for inversion of the posts in the second stage of treatment, or zinc sulphate may be substituted. Copper sulphate followed by sodium fluoride or by borax-boric acid appears promising. Green pine posts may be completely immersed in strong solutions; increased temperature hastens the process. For instance, 1-in. pine lumber soaked for 3 hours in 20 per cent. solutions of copper sulphate and sodium chromate at approximately 50° C. was completely penetrated after seasoning, but results with hardwood were less promising. The process is most widely and successfully applied in cooling towers, the two solutions being circulated over the tower for some three days each, with an interval of three days between. To date 58 towers have been treated since 1952.

Pine blocks treated with ammoniacal solutions of acrylonitrile have been completely resistant in soil-block tests.

WAID (J. S.) & WOODMAN (M. J.). **A non-destructive method of detecting diseases in wood.**—*Nature, Lond.*, 180, 4575, p. 47, 1957.

At the Nature Conservancy, Merlewood Research Station, Grange-over-Sands, Lancashire, measurements of the transmission of ultrasonic energy through wood were used to determine the presence of decay. Transmission was measured both down and across the grain. Areas on opposite sides of the sample were smoothed to give plane surfaces 25 sq. cm. in area and smeared with a coupling agent to ensure perfect contact between the probes of the detector and the wood.

The transmission of ultrasonic energy through wood was considerably reduced when only slight defects were present. Red pine infected with dry rot [*Merulius lacrymans*] did not permit the transmission of ultrasonic energy through only 5 cm. while it was transmitted through 130 cm. of sound, seasoned beech.

The flaw detectors used in these preliminary experiments were the Kelvin Hughes Mark V and the Kraut Kramer Mark IX. The percentage transmission through birch infected by *Polyporus betulinus* (32 per cent. volume of rot) was 17 to 33 across the grain and 10 to 38 down the grain, compared with 100 in sound birch. Completely rotten birch transmitted no energy.

The percentages for oak with pockets of [unspecified] rot were 12 to 50 across the grain and 15 to 55 along, compared with 100 in sound wood and 3 to 23 across the grain of sound wood with a hole $\frac{1}{2}$ in. in diameter drilled longitudinally.

The development of this technique would facilitate the early detection of disease in plantations and also reduce losses of timber in storage by providing a rapid method for diagnosing incipient decay.

TAMAYO (B. P.) & ORILLO (F. T.). **Seed treatment of vegetables for control of damping-off.**—*Philipp. Agric.*, 40, 10, pp. 519–523, 1957.

Of five fungicides tested during 1953–55 at the Central Experiment Station, Laguna, Philippines, against pre-emergence damping-off of various vegetables, spergon proved most effective on cabbage, lettuce, and eggplant and arasan SF-X on tomato. Cucumber in particular benefited from seed treatment, Crag 5400 and granosan proving equally effective. Emergence of Chinese cabbage seedlings was very significantly increased by granosan, semesan, and spergon. Applications throughout were at 0.5 per cent. of seed weight.

None of the fungicides gave satisfactory control of post-emergent damping-off caused chiefly by *Pythium debaryanum* and *Rhizoctonia* [*Corticium*] *solani*.

HAAVISTO (M.), JAMALAINEN (E. A.), & YLIMÄKI (A.). **Observations on the effect of pentachloronitrobenzene on the low-temperature pathogens in winter**

Turnip Rape.—*Valt. Maatalousk. Julk.* 148, pp. 62–67, 1 fig., 1956. [Finnish summary.]

In a preliminary test in Finland treatment of winter turnip rape fields on 15th December, 1954, with PCNB (botrilex) at a dosage of 100 kg. per ha. gave good control of *Typhula betae* [36, p. 293], increasing the seed yield by 865 kg. per ha. (50 per cent.) and that of the stalks by 1,005 (28). In another experiment in which the fungicide was applied on 6th October at 25 kg. per ha. the combined seed and stalk increase was 2,980 kg. per ha. (47 per cent.).

ROSSER (W. R.). **Control of club root of Brassicae.**—*Plant Path.*, 6, 2, pp. 42–44, 1957.

A trial on the control of *Plasmodiophora brassicae* [cf. 35, p. 872] on Ellam's Early cabbage was carried out on heavily infected land at Wolverhampton in 1956. Griseofulvin applied twice to the seed-bed (at 13 days after sowing and 47 days later) as a 30 per cent. dust at the rate of 1 oz. per 100 feet of drill, and further used as a slurry (obtained by mixing 1 lb. of 50 per cent. wettable powder in 5 gals. of water, in which the roots were dipped at transplanting), gave a mean of 4.5 healthy plants and 12 marketable heads per plot of 17 plants. The corresponding figures for cadmium and mercuric chloride, both 1 in 2,000, and PCNB (75 per cent. wettable powder used as an aqueous suspension containing 0.75 per cent. of the active ingredient), all applied at $\frac{1}{2}$ pint to each dibble hole, were, respectively, 5.13 and 10.25; 9.63 and 15; 8.5 and 8.63. The control plots gave 3.56 and 8.04. The weight of green matter with griseofulvin and cadmium chloride (28 and 27.13 lb., respectively) was also significantly lower than that obtained with mercuric chloride (39.88 lb.). The weight of the root systems of plants treated with PCNB was significantly low, indicating possible phytotoxic damage in the rhizosphere [cf. 19, p. 130].

WALKER (J. C.), LARSON (R. H.), & POUND (G. S.). **Badger Ballhead, a new Cabbage resistant to yellows and mosaic.**—*Phytopathology*, 47, 5, pp. 269–271, 1 fig., 1957.

An account is given of a new cabbage variety, Badger Ballhead, bred by the United States Department of Agriculture, in co-operation with the University of Wisconsin, Madison [34, pp. 85, 581]. Derived from a cross between Wisconsin Ballhead and Wisconsin Hollander [28, p. 103] it is homozygous for monogenic resistance to yellows (*Fusarium oxysporum* f. *conglutinans*) [*F. conglutinans*: cf. 35, p. 649], being completely free from yellows in the final test, and moderately resistant to mosaic (cauliflower and turnip mosaic viruses combined) [cf. 31, p. 312], being more so than other yellows resistant varieties of the same type.

ISAAC (I.). **Verticillium wilt of Brussels Sprout.**—*Ann. appl. Biol.*, 45, 2, pp. 276–283, 1 pl., 1 fig., 1957.

A wilt disease of Brussels sprouts, symptoms of which were first observed near Evesham in 1951, was shown to be caused by *Verticillium dahliae*, and in the wet 1956 caused 80 per cent. loss in a five-acre field. The causal organism may be identical with the *V. albo-atrum* recorded as causing a similar disease in the United States in 1950 [29, p. 448].

Yellowing and browning of the leaves, rather than wilting, occurred, and marked unilateral appearance of symptoms both internal and external was typical, often only half a leaf being affected. The stem tissues showed the dark browning associated with *Verticillium* wilts, and a wet summer advanced the onset of the disease. Mycelium was sparsely developed and confined to the xylem vessels, and neither internal nor external sporulation was observed.

As nine different strains or species of *V.*, wound-inoculated into Brussels sprouts, failed to induce wilt, and the isolate from Brussels sprouts was non-pathogenic to a wide range of plants, a distinct physiological strain of the fungus would appear to be involved. Variations in the amounts of calcium, nitrogen, phosphate, and potassium present in the soil had no effect on incidence. The pathogen was not seed-borne, but was spread on plant debris by agricultural machinery, and all the plants in an infected field should be burnt, and machinery properly cleaned after use. Resistant crops, such as runner beans [*Phaseolus vulgaris*], cauliflowers, and broccoli should be substituted in diseased soil. The selection of resistant varieties of Brussels sprouts is under investigation.

VÖLK (J.) & KRCZAL (H.). **Übertragungsversuche mit *Piesma quadratum* Fieb., dem Vektor der Kräuselkrankheit der Zucker- und Futterrübe.** [Transmission tests with *Piesma quadratum* Fieb., the vector of leaf curl disease of Sugar- and Fodder-Beet.]—*NachrBl. dtsh. PflSchDienst* (Braunschweig), Stuttgart, 9, 2, pp. 17–22, 2 figs., 1957.

At the Institute for Agricultural Virus Research, Brunswick, three experiments were made to test the efficiency as vectors of beet leaf curl virus of adults of the aphid *Piesma quadratum* [*Zosmenus quadratus*: 35, p. 741] that had acquired the virus either in the larval stage, or after reaching maturity, or as adults after hibernation. The first category did not transmit the virus until adult, and then poorly (41 out of 267 plants), the alternative use of cotyledons or foliage leaves for feeding being immaterial. The second class gave better results, with 32.5 per cent. infection via cotyledons and 23 on leaves. With the hibernated aphids the transmission rate was much higher (53.3 per cent.) [cf. 22, p. 508]. It would seem that the virus multiplies within the vector.

As *Z. quadratus* is found in nature on wild members of the Chenopodiaceae, 11 species of this family were examined by feeding infectious aphids on alternate days on healthy beet plants (to confirm infectivity) and on the test plants. None developed symptoms and symptomless infection was also shown not to occur. In efforts to find a suitable indicator plant, New Zealand spinach (*Tetragonia [expansa]*), broad beans, pea, *Capsella bursa-pastoris*, and tobacco were inoculated with expressed sap, but none proved suitable. Plate leaf tests [28, p. 78] with *Gomphrena globosa* and *Solanum demissum* were also negative.

MÖLLERSTRÖM (G.). **Sugar Beets exhibiting symptoms of magnesium deficiency are getting more common.**—*Socketer*, 12, 14, pp. 170–172, 1956.

Previous investigations on magnesium deficiency of sugar beet in southern Sweden [34, p. 566] are reviewed and its increasing prevalence in the province of Scania is demonstrated from the results of field trials by the Swedish Sugar Corporation, which revealed 6.2 per cent. affected plants in the latter half of September, 1955. The root weights of 50 healthy and magnesium-deficient beets were 538 and 466 gm. respectively, and the sugar yields 94 and 83 respectively, representing reductions of 13.4 and 11.7 per cent.

HOFFMANN (G. M.). **Über den Gürtelschorf und den Rübenschorf der Zuckerrübe.** [On girth scab and Beet scab of the Sugar Beet.]—*NachrBl. dtsh. PflSchDienst*, Berlin, 10, 8, pp. 162–165, 2 figs., 1956.

The intention of this article from the Institute for Plant Pathology, Aschersleben, Germany, is to emphasize to German authors the need to draw a clear distinction between girth scab (the causative agent of which is still in doubt, as Krüger's claim of actinomycotic origin (1905) appears unreliable), beet scab (from which *Streptomyces* [*Actinomyces*] *scabies* is always to be isolated [cf. 35, p. 569]), and 'blister scab' (*Erwinia scabiegena*) [34, p. 14].

From the fairly detailed descriptions given, a more or less distinct girdling would appear to be characteristic, though not always present, in girth scab, above which the root is irregularly swollen, often hollow as a result of internal destruction, and easy to break off. In the affected subterranean parts, which usually form a 'waist', but may include the whole root, or one or more zones of it, the outer cortical layers are leathery or woody, brown, and deeply cleft by intersecting fissures. The brown tissues are necrotic and overlies a regenerated secondary cortical layer also cleft by intersecting furrows, comprising successive layers of vascular bundles. Heavy rain in spring with low temperatures in May and June are conducive to the disease, which is practically confined to heavy soils.

In beet scab, by contrast, the lesions are single or grouped in wart-like prominences with depressions at their centres. At the surface is a layer of brown, dry, necrotic tissue overlying sound tissue, from which it is separated by a clearly defined corky layer. Affected roots do not become woody.

The author concludes that while the causation of the disease remains uncertain the term 'girth scab' may be regarded as a convenient collective term for scabby changes not referable to beet or 'blister' scab [of which he gives no description]. He notes that the 'scurfy root' of Hull [29, p. 241], is very similar to girth scab.

The description of beet scab was based on material received from Mecklenburg and Hamburg in 1955, where the percentage of girth scab was over 90.

KEYWORTH (W. G.). The use of streptomycin against silvering disease of red Beet.—
Ann. appl. Biol., 45, 1, p. 215, 1957.

At the National Vegetable Research Station, Wellesbourne, Warwickshire, soaking Cheltenham Greentop red beet seed for 24 hr. in a solution containing 200 p.p.m. of streptomycin reduced the incidence of *Corynebacterium betae* [36, p. 158] from 1 per cent. in the untreated to 0.025 per cent. in the plots from the treated seed. In a large commercial trial only 0.1 per cent. infection developed in four acres of plants from treated seed as against 60 per cent. in four from untreated.

THAUNG (M. M.). Bacterial blight of Lima Bean.—*Diss. Abstr.*, 16, 11, p. 1991, 1956.

At the University of Wisconsin a study was made of the factors affecting the epidemic occurrence of *Pseudomonas syringae* [29, p. 600] on Lima bean (*Phaseolus limensis*) [*P. lunatus*] in Wisconsin. The pathogen was unable to survive in soil in the absence of the host for a year and red clover did not act as a reservoir host [cf. 3, p. 264]. The use of crop rotation and clean seed should check the disease.

The optimum and minimum temperatures for the development of *Pseudomonas syringae* were 28° and 16° C., respectively.

A high disease index was obtained with plants grown with high nutrient levels or with high nitrogen and low potassium and phosphorus. In culture, growth and pigment production by *P. syringae* were dependent on asparagine but not on sucrose.

KLEMENT (Z.). Two new bacteriophages for bacterial pathogens of the Bean.—
Nature, Lond., 180, 4575, pp. 41-42, 1957.

At the Research Institute for Plant Protection, Budapest, specific bacteriophages for the bean [*Phaseolus vulgaris*] pathogens *Corynebacterium flaccumfaciens* and *Xanthomonas phaseoli* var. *fuscans* were isolated from naturally infected bean seeds. On 0.75 per cent. glucose broth agar the plaques of *C. flaccumfaciens* phage were clear and circular, 1 to 2 mm. in diameter with entire margins, and formed after 10 to 12 hr. at 28° C. Those of *X. phaseoli* var. *fuscans* phage appeared after 20 to 24 hr. and were 3 to 4 mm. in diameter with entire margins. The latter phage is highly specific and is unable to lyse *X. phaseoli* [cf. 34, p. 568].

LEHOCZKY (J.) & KLEMENT (Z.). **Bacterial blight of the umbels of Carrot in Hungary.**—*Acta microbiol. Acad. Sci. Hung.*, 4, 2, pp. 147–153, 5 figs., 1957.

Xanthomonas carotae [cf. 31, p. 321] was observed on carrot in seed fields in the Bekes region of Hungary in 1955, constituting a new record for Europe. Successful inoculations were carried out under greenhouse conditions.

KOTTHOFF (P.). **Der Möhrenblattbrand.** [Carrot leaf blight.]—*Gesunde Pfl.*, 8, pp. 106–109, 1956. [Abs. in *Zbl. Bakt.*, Abt. 2, 110, 11–15, p. 434, 1957.]

In July and August, 1955, carrots in Westphalia, Germany, were affected by a disease involving rapid necrosis and shrivelling of the whole leaf tuft. The dimensions of the *Alternaria*-type conidia on the dead leaves ranged from 39 to 246 by 8 to 25 μ and the numbers of transverse and longitudinal septa from 3 to 10 and 0 to 2, respectively. On potato and carrot agar the size ranged from 18 to 63 by 9 to 15 μ . The fungus was tentatively identified as *A. radicina* [*Stemphylium radicinum*], but the black root rot characteristic of that species was not observed. The sudden outbreak was traced to heavy contamination of the seed, which was effectively combated by treatment with ceresan.

BRAUER (H. O.) & RICHARDSON (R. W.). **El Chile. Indicaciones generales para su cultivo.** [Chilli. General directions for its cultivation.]—*Foll. Divulg. Secret. Agric. M  x.* 23, 26 pp., 1 col. pl., 11 figs., 1957.

On pp. 17–24 of this publication reference is made to the principal nursery diseases of chilli in Mexico, which are damping-off (*Pythium* spp.), root rot (*Rhizoctonia* spp.), early blight (*Alternaria* spp.), and late blight (*Phytophthora* spp.) [cf. 2, p. 101]. Chilli mosaic virus, chilli leaf curl virus [cf. 33, p. 582; 35, p. 279], and tobacco and cucumber mosaic viruses are also encountered.

Pythium is controlled by arasan 50 per cent. or semesan 30 per cent., each at 12.5 gm. per 10 l. water; *R.* spp. and *A.* spp. by yellow copper oxide or zerlate at 18 and 24 gm., respectively; and *Phytophthora* by insoluble copper or dithane A-78, each at 25 gm.

KLEMENT (Z.). **Bacterial soft rot in green Pepper (*Capsicum annum*).**—*Acta microbiol. Acad. Sci. Hung.*, 3, 4, pp. 409–416, 4 figs., 1956. [Russian summary.]

A soft rot of green [chilli] pepper, attacking the fruit and sometimes extending to the peduncle and stalk but not affecting the leaves, was widespread in Hungary in 1954 and 1955. The causal organism is regarded as identical with *Bacterium* [*Pseudomonas*] *syringae* var. *capsici*, which had previously been reported from Italy [21, p. 426]. Affected fruits should be removed and destroyed and crop rotation practised.

G  TTE (WALTRAUT). **  ber das Auftreten von Selleriemosaik in Deutschland.** [On the occurrence of Celery mosaic in Germany.]—*NachrBl. dtsh. PflSchDienst (Braunschweig)*, Stuttgart, 9, 7, pp. 99–101, 5 figs., 1957.

At the Marhof Experimental Station, University of Bonn, in 1955, a disease of celery characterized by a light-coloured leaf spot, stunted growth, and vein-clearing of the youngest leaves, was successfully transmitted by inoculation with carborundum to celery, coriander (*Coriandrum sativum*), and carrots, which expressed symptoms of infection after two to three, three to four, and eight weeks, respectively. The transmission to coriander was difficult and only two out of 20 plants became infected. Transmission to celery was easily effected by *Myzodes* [*Myzus*] *persicae*.

The disease in question, which occurs sporadically in the Cologne-Bonn district, is considered to be identical with western celery mosaic virus [celery mosaic virus: cf. 32, p. 660].

Some diseases of Lettuce.—*Agric. Gaz. N.S.W.*, 68, 4, pp. 200–203, 6 figs., 1957.

Most of this information on lettuce diseases occurring in New South Wales has already been noticed [24, p. 439]. Lettuce mosaic virus [cf. 35, p. 354], though destructive in other parts of Australia, has so far been of little importance in New South Wales.

SCHMIDT (TRUDE). **Unter welchen Krankheiten leiden unsere Salatkulturen und wie bekämpfen wir die Erreger?** [From what diseases do our cultivated Lettuces suffer and how do we control the causal organisms?—*Pflanzenarzt*, 10, 7, pp. 62–63, 1957.

Downy mildew [*Bremia lactucae*: 34, p. 270] and rot caused by *Sclerotinia* sp. [cf. 29, p. 404] are the most important lettuce diseases in Austria. *S.* sp. is controlled by brassicol at 30 to 40 gm. per sq. m. Lettuce mosaic virus [34, p. 210] has become a problem in recent years.

AKAI (S.), TAKAHASHI (M.), & TAKEUCHI (T.). **Studies on the mechanism of damping-off resistance in the seedlings of Cucurbitaceae plants. 1. Anatomical observation of the invasion of *Pythium* fungi into hosts.**—*Forsch. PflKr.*, Kyoto, 6, 1, pp. 1–5, 5 figs., 1956. [Japanese, with English summary.]

At the College of Agriculture, Kyoto University, the Amakuri variety of pumpkin [34, p. 120], which is highly resistant to *Pythium* spp., showed cytoplasmic browning of the invaded and neighbouring cells when inoculated with *P. ultimum*, *P. aphanidermatum*, and *P. zingiberum*, no further hyphal development of the causal fungus being observed. In the susceptible Fushinari variety of cucumber, however, there was no browning but only a water-soaked appearance, and hyphae developed vigorously. Though resistant to *Pythium*, Amakuri is highly susceptible to *Rhizoctonia* sp. and while the cells invaded by this pathogen showed no definite browning, hyphal development was vigorous.

RANGASWAMI (G.). **Bacterial soft-rot of Chicory.**—*Curr. Sci.*, 26, 5, pp. 153–154, 1 fig., 1957.

Investigations at the Mycology and Plant Pathology Section, Agricultural Research Institute, Coimbatore, India showed *Erwinia carotovora* to be responsible for a soft root rot of chicory [cf. 13, p. 492], observed in 1956 in the vicinity of Coimbatore. Symptoms were reproduced by wound inoculation. The disease was particularly severe on alkaline and ill-drained areas and on soils of poor fertility.

MISRA (A. P.). **A new disease of *Trapa bispinosa* Roxb.**—*Plant Prot. Bull.*, New Delhi, 6, 2, pp. 41–42, 1954. [Received 1957.]

Trapa bispinosa, a valuable food crop in India, is stated to have been disease-free until 1950 when *Sclerotium rolfsii* was first recorded in New Delhi causing a severe leaf rot, which now occurs regularly.

JHA (A.) & MISHRA (J. N.). **Yellow-vein mosaic of Bhindi (*Hibiscus esculentus* L.) in Bihar.**—*Proc. Bihar Acad. agric. Sci.*, 4, pp. 129–130, 1955. [Received 1957].

In Bihar the incidence of yellow vein mosaic virus on *Hibiscus esculentus* [35, pp. 279, 282, *et passim*] varies from 50 to 90 per cent., and does not decrease following a two-month break in cultivation during the hot season. In preliminary experiments in which infected weeds were grafted on healthy *H. esculentus* it was shown that the virus is carried in *Malvastrum tricuspidatum*.

JENNINGS (D. L.). **Further studies in breeding Cassava for virus resistance.**—*E. Afr. agric. J.*, 22, 4, pp. 213–219, 1957.

In further work in 1954–5 in Tanganyika on breeding for resistance to virus

diseases in cassava, [cf. 26, p. 281; 36, p. 163, *et passim*], the plants were plucked in early April and again in early May, thus increasing the incidence of mosaic symptoms on moderately resistant varieties and making the tests more severe. Plants were scored for mosaic at the end of a trial, the proportion of branches affected and symptom intensity both being taken into account. The recording can be simplified as follows: M1, only one branch affected, no leaf distortion; M2, one branch, with leaf distortion; M3, more than one but less than half the branches affected, with or without leaf distortion; and M4, more than half the branches affected, with or without leaf distortion. With brown streak virus [cf. 29, p. 399], the necrotic stem symptoms were scored after paring away a thin layer of tissue from the abscission tissues left after the normal shedding of the leaves.

Resistance of hybrids to mosaic virus varied with the locality and season. The conflicting results were apparently uninfluenced by differences in virus strain, though they could often be explained by differences in factors affecting plant growth. If mosaic affects a resistant plant early in its life, the chances of recovery are greater than if the plant becomes affected at a later stage. With brown streak virus differences in the resistance of hybrids could usually be related to altitude and temperature.

It is not possible to declare that a clone is very highly resistant or immune from one test. The best hybrids were those from *Manihot glaziovii*; in this series, resistance was improved when third back-cross hybrids were inter-crossed.

STOREY (H. H.) & RYLAND (AUDRIE K.). **Viruses causing rosette and other diseases in Groundnuts.**—*Ann. appl. Biol.*, 45, 2, pp. 318–326, 2 pl., 1957.

In experiments in gauze-protected glasshouses at Amani, Tanganyika, and Muguga, Kenya, the authors, working with the East African Agriculture and Forestry Research Organization, Kikuyu, Kenya, separated from groundnut plants affected by the form of rosette virus known as mosaic rosette [7, p. 486] (characterized by discrete areas of green and chlorotic tissue on the leaflets) a virus that produced only a mild mottle or sometimes a mottle with rare chlorotic flecks. This was separated on occasion by leaf grafts, by mechanical inoculation, and by *Aphis craccivora* [cf. 35, p. 575]. Natal Common groundnut plants inoculated simultaneously with the mottle virus and normal rosette virus usually developed the mosaic-rosette symptoms. When the mottle virus was introduced 14 to 35 days before the rosette virus, however, the plants failed to show any severe chlorosis, the mottle virus protecting the plant from the virus causing the severe chlorosis of full rosette, whether the inoculation was effected by aphids or grafting.

Plants displaying two other forms of mild mottle were collected in the field, and the viruses from them proved transmissible by grafting or mechanical means, but not by *A. craccivora*. In plant protection tests, one of these two forms failed to protect plants from developing chlorotic symptoms when inoculated with the rosette virus, though the doubly infected plant was less severely attacked than one infected with the rosette virus alone.

It is concluded that mosaic rosette is the symptom expression of simultaneous infection with at least two distinguishable viruses that are related strains, the chlorosis-producing virus predominating. The two other forms of mild mottle found are apparently caused by a virus or viruses different from and unrelated to the mottle virus from mosaic rosette.

THUNG (T. H.) & HADIWIDJAJA (T.). **De heksenbesemziekte bij Leguminosen.** [Witches' broom disease in the Leguminosae.]—*Tijdschr. PlZiekt.*, 63, 2, pp. 58–63, 8 figs., 1957. [English summary.]

At the Faculty of Agriculture, Bogor (Java), witches' broom diseases were

studied on the following legumes [cf. 36, p. 635]:—groundnut [36, p. 448], *Crotalaria anagyroides*, *C. juncea*, *C. striata*, *C. usaramoensis* [31, p. 557], *Sesbania sericea*, *Indigofera suffruticosa*, soy-bean, *Canavalia ensiformis*, *Phaseolus radiatus*, *P. calcaratus*, *P. lunatus*, cowpea, and *Pachyrrhizus erosus*, the last nine being listed in order of decreasing frequency of infection.

The most striking symptoms are excessive branching, dwarfed leaflets, and malformation of the flowers, and they vary in intensity with the host and the stage at which infection occurs. For instance, excessive branching is characteristic of *C. usaramoensis* and antholysis in *C. juncea*; *S. sericea* branches extensively from the axils of the leaves, and even of the leaflets, while in *Phaseolus* spp. and cowpea the axillary buds proliferate markedly. The witches' broom of *S. sericea* has been transmitted by grafting, but those of the *Phaseolus* spp., soy-bean, and *Indigofera* have not yet been proved due to virus infection.

To investigate possible transmission by the aphid vector, *Orosius argentatus*, an experiment was carried out with groundnut, *C. juncea*, and *C. usaramoensis*. Four-day-old larvae from a stock of the vector maintained over several years in the laboratory were allowed to feed for 10 days on an infected plant of the source species used, after which they were transferred (three per plant) to three young plants of the recipient species for 10 days and then again for a further 10 days to three other recipient plants of the same species, the inoculated plants then being kept under observation for 50 days. The tests were carried out in three series covering February to May, March to June, and July to September, respectively, and the results are tabulated. Transmission was achieved in the first series between plants of *C. juncea*, but not between groundnuts; in the second series between groundnuts, from *C. juncea* to groundnut, and vice versa, and in the third series between *C. juncea*, from *C. juncea* to groundnut, from *C. usaramoensis* to *C. juncea*, and from groundnut to *C. juncea*. Twenty-two out of the 24 transmissions obtained occurred during the second 10-day feeding period. The authors conclude that comparative studies are needed to reveal the relationship between the disease under study and other virus diseases transmissible by *O. argentatus* [31, p. 125; 36, p. 190]. Mechanical inoculation did not prove possible.

HEIN (ALICE). **Beiträge zur Kenntnis der Viruskrankheiten an Unkräutern. II. Das Luzernemosaik- und das Lamium-Gelbmosaikvirus.** [Contributions to the knowledge of the virus diseases of weeds. II. The Lucerne mosaic and the *Lamium* yellow mosaic viruses.]—*Phytopath. Z.*, 29, 1, pp. 79–116, 20 figs., 1 diag., 1957.

In this further comprehensive survey and discussion of the viroses of weeds [36, p. 450 and next abstract] the author reports *Sonchus oleraceus*, *S. arvensis*, and *Solanum nigrum* as hitherto unknown natural hosts of lucerne mosaic virus in Germany [35, p. 895]. On the two *Sonchus* spp. the symptoms consist of yellow bandings and ring patterns, while *Solanum nigrum* reacts by a more or less extensive yellow spotting. As a perennial, *Sonchus arvensis* may be important in the perpetuation of the virus.

Sap-transmission experiments with isolates of lucerne mosaic virus from the two *S.* spp. and *Solanum nigrum* gave positive results on beet, *Chenopodium quinoa* (on which the symptoms were particularly well differentiated), and a number of other plants including *Campanula persicifolia* [var.] *trachelioides* (*S. nigrum* strain only), and *Zinnia* (*S. nigrum* strain excepted).

All three isolates were inactivated by 10 min. exposure to a temperature between 62° and 64° C. and by seven days' ageing at room temperature. The dilution end point lay between 1 in 100,000 and 1 in 500,000.

Activity was still retained after 100 days' desiccation. From the results of premunization experiments on tobacco, in which each of the three isolates

conferred reciprocal protection, it is concluded that they are nearly related if not identical.

A brilliant yellow mosaic of *Lamium purpureum* was transmissible by grafting only to plants of the same host, but the results of a field experiment in 1954-5 confirmed the supposition that the virus is spread by [unidentified] insects.

HEIN (ALICE). **Beiträge zur Kenntnis der Viruskrankheiten an Unkräutern. III.**

Das Gurkenmosaikvirus. [Contributions to the knowledge of virus diseases of weeds. III. Cucumber mosaic virus.]—*Phytopath. Z.*, 29, 2, pp. 204-229, 15 figs., 1957.

Continuing her studies on weed viroses in Germany [see preceding abstract], the author reports the detection of cucumber mosaic (identified on the basis of transmission tests, physical properties, and premunity relationships) in *Galinsoga quadriradiata*, *G. parviflora*, *Mercurialis annua*, *Sonchus oleraceus* (a hitherto unrecorded host), *Datura stramonium*, and *Solanum nigrum*. *G. parvifolia* and *D. stramonium* were observed by Heinze to serve as 'intermediaries' of the lupin browning virus (*Mitt. biol. ZentrAnst. Berl.*, 59, pp. 84-86, 1939), which Köhler [15, p. 101] regards as identical with cucumber mosaic virus; *D. stramonium* was found naturally infected by Ainsworth [14, p. 554], *M. annua* by Tjallingii [33, p. 577], and *S. nigrum* by Köhler and Klinkowski [33, p. 580]. As annuals these species can contribute to the spread of the virus only within the growing period, and then probably as links in the chain between garden plants and field crops.

The weeds under observation react to infection by a more or less distinct mottling, accompanied in *G. spp.* and *M. annua* by severe leaf curl and blistering. Particulars are given of the symptoms induced by inoculation with the several isolates on *Chenopodium quinoa* [35, p. 269], spinach, broad bean, *D. stramonium*, tobacco, *Nicotiana glutinosa*, white *Petunia hybrida*, cucumber, and *Zinnia elegans*, all of which proved useful for purposes of identification and differentiation.

HITCHBORN (J. H.). **The effect of temperature on infection with strains of Cucumber mosaic virus.**—*Ann. appl. Biol.*, 44, 4, pp. 590-598, 1 pl., 1956.

In studies at the Molteno Institute, Cambridge, strains of cucumber mosaic virus, shown by cross protection tests to be related, were found to differ in their ability to multiply in plants at 37° C. [cf. 34, p. 512]. One strain was obtained from a chrysanthemum in England, in which it was accompanied by a second virus, possibly Noordam's chrysanthemum virus B [32, p. 559; 35, p. 299], one was from Rothamsted, while a yellow strain (Price's No. 6) [14, p. 5] and three of Fulton's strains from spinach, A, C, and F [30, p. 135], were from the central United States.

Experiments in which tobacco plants systemically infected by the Rothamsted and yellow strains, and chrysanthemum plants infected by the chrysanthemum strain, were maintained at 37° for up to 35 days showed that the yellow strain persisted through such treatment, symptoms redeveloping in the mother plants within six weeks and in rooted cuttings taken from them, whereas the Rothamsted and chrysanthemum strains disappeared from most of the plants, which were still free from virus 2½ months after treatment.

Subjecting tobacco plants to 37° immediately after inoculation greatly reduced the subsequent appearance of lesions [cf. 32, p. 538] caused by the Rothamsted strain, which never became systemic, but had little effect on the yellow strain; the reactions of strains A, C, and F were varied, though all finally became systemic. On the other hand, both the Rothamsted and yellow strains were rapidly inactivated in expressed sap at 37°.

Samples taken after one, two, and four days from leaves of tobacco plants inoculated with the yellow strain produced 9, 51, and 71 lesions per half leaf on Canadian Wonder bean (*Phaseolus vulgaris*) at 25° and 11, 9, and 5 at 37°, but

though less virus accumulated in four days at 37°, more acute symptoms were produced.

In bean the chrysanthemum, Rothamsted, and yellow strains did not become systemic, but produced small necrotic lesions, the number and size of which were affected by temperature; fewer were formed in plants kept for 24 hours at 25° after inoculation with the yellow strain and then returned to 15° than if kept continuously at 15°.

It is significant that the strains which multiplied in plants at 37° were obtained from naturally infected plants in the central region of the United States, the yellow strain being a mutant of a strain from such a plant. The high summer temperatures prevailing there might favour the multiplication of strains able to withstand heat. The other strains came from natural infections in southern England. It is thus possible that heat treatment of a virus that has high temperature strains might only result in supplanting the ones destroyed by heat by others that are not.

HEINZE (K.). **Weitere Versuche zur Übertragung von phytopathogenen Viren mit Blattläusen.** [Further tests on the transmission of plant-pathogenic viruses by aphids.]—*NachrBl. dtsh. PflSch Dienst (Braunschweig), Stuttgart*, 9, 2, pp. 22–25, 2 figs., 1957.

At the Institute for Horticultural Virus Research, the Federal Biological Institute, Berlin–Dahlem, the authors examined 70 species of aphids for their ability to transmit various viruses after long and short feeding periods. The tabulated results indicate that the subfamilies Myzinae and Dactynotinae in addition to Aphidinae furnish a number of effective vectors. 'Ajuga', 'Datura', and 'bush' ('Stauden') viruses, detailed descriptions of which are shortly to be published, were transmitted by *Myzodes* [*Myzus*] *persicae* and the first named also by *Dysaulacorthum vincae* and *Macrosiphon* [*Aulacorthum*] *solani*.

HOWLES (R.). **Attempts in the chemotherapy of virus-infected glasshouse plants.**—*Plant Path.*, 6, 2, pp. 46–48, 1957.

The results of experiments at Cheshunt Research Station during 1950–56 on the chemotherapy of virus infections, most of which have been noticed from the reports of that Station [cf. 35, p. 656], are summarized, and some of the data tabulated.

SCHARPENSEEL (H. W.) & MENKE (K. H.). **Über Tastversuche zur Frühdiagnose von virösen Pflanzenkrankheiten nach neuen Methoden.** [On preliminary experiments in the early diagnosis of plant viroses by new methods.]—*Landw. Forsch.*, 10, 1, pp. 60–63, 2 figs., 1957. [English and French summaries.]

The first of the two methods for the early diagnosis of plant viroses herein described is based on differences in the colour and structure between lyophilized expressed saps of infected and healthy plants. For instance, in cadang-cadang disease of coco-nut [36, p. 695], specimens from sound root systems are about 1 cm. in height, foamy, voluminous, and of a brown to reddish colour, while those from diseased material were only about 3 mm. high, compact, and yellow. The second method rests on the phenomenon of virus agglutination after breeding in the chorio-allantoic fluid of 10-day-old chicken embryos.

The procedures also enabled a clear-cut differentiation to be made between healthy and diseased tissues in the cases of [unspecified] potato mosaic and abaca [cucumber] mosaic virus of *Musa textilis* [36, p. 646].

KÖHLER (E.). **Über die Beziehung zwischen Viruskonzentration von Impflösungen und Infektionshäufigkeit. III. Der Einfluß infektionshemmender Säfte auf die**

Infektiösitätsverdünnungskurve. [On the relation between virus concentration of inoculum solutions and infection frequency. III. The influence of infection-inhibiting saps on the infectivity dilution curve.]—*Phytopath. Z.*, 29, 2, pp. 197–203, 9 graphs, 1957.

In further studies [36, p. 557], when infective solutions of potato viruses A and Y were mixed with sap of *Datura stramonium* and inoculated in serial dilutions into Samsun tobacco, the infectivity dilution curve showed a sharp initial rise, followed by a gradual decline. When the *D. stramonium* sap was added to the inocula in decreasing quantities, the infection dilution curve increased regularly during the initial phase (at least until a dilution of 1 in 64 in the case of virus A) and thus assumes the character of an ordinary dosis-effect curve. Evidently, therefore, the inhibition of infection produced by the sap of *D. stramonium* results in the main from a toxic action on the inoculated tissue. The same mode of inhibition was observed in a comparable experiment with tobacco mosaic virus, but a marked anomaly requiring closer analysis occurred in an inoculation test with potato virus X on *D. stramonium*.

An admixture of White Burley tobacco sap with potato virus A produced an infectivity dilution curve similar to that described for *D. stramonium* but less pronounced [cf. 16, p. 497].

In conclusion, it was demonstrated that the sap of Samsun tobacco exerts no inhibitory effect on the infection of *Nicotiana glutinosa* by tobacco mosaic virus.

RAWLINS (T. E.). A modification of Bald's stain for viruses and for cell inclusions associated with virus infections.—*Phytopathology*, 47, 5, p. 307, 1957.

As Bald's stain for viruses [28, p. 491] has given somewhat variable results at the University of California, Berkeley, a modification is suggested. The epidermal strips are floated on water, fixed in Bald's fixative for at least 80 min., and after washing as recommended left in water for 15 min., transferred to a slide, the water removed, and the strip covered with undiluted Giemsa without orange G. Then wash in several changes of distilled water for 20 min., when the strip will appear purple, add drops of absolute ethanol only until the colour begins to change to blue or green, when clove oil is added until no more green colour is washed out; the strip is then ready for mounting in xylene followed by H-S-R dried resin in xylene or toluene.

WILKINS (V. E.). Second report of the working party on phytosanitary regulations (Rome, December 15–17, 1955; Wageningen, October 25–26, 1956).—27 pp., Paris, European and Mediterranean Plant Protection Organisation, 1957. [With French version.]

The two meetings reported herein dealt mainly with various complications, involving in certain cases administrative and political considerations, arising in the formulation of phytosanitary regulations affecting various countries. The points dealt with included *inter alia* the definition of the responsibilities of the plant protection services with regard to plants in transit; relationship between the plant protection services and trade and farming interests; unnecessary phytosanitary certificates; fumigation; phytosanitary aspects of pre-packaging; distance requirements, i.e. those stipulated between a crop grown for export and an infected crop, with special reference to the difficulties in frontier areas; inspection of produce for export; and the question of an international refresher course for inspectors. Tables are given showing the nature of the training of plant-protection inspectors provided in some European countries and the volume of imports and exports handled, with the numbers of inspectors employed.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, 5, 8, p. 131, 1957.

Details are given of Notification S.R.O. 3158 of the Ministry of Agriculture, published in *Gaz. India*, 52, 1956 (an amendment of No. F. 320/35-A of 1936), prohibiting the importation into India of cacao plants and seeds from Africa, the West Indies, and Ceylon, and permitting them from other countries only for research and propagation by an institution under governmental control, and then only provided they have been duly certified.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, 5, 9, pp. 146–147, 1957.

Order No. 1 of 22 October, 1956, published in the *Rec. Lois féd.*, 53, 1956, defines the phytosanitary regulations applying to the importation of forest tree material into Switzerland and prohibiting the entry of various pathogens, including *Chalara quercina* and *Endothia parasitica*.

TARR (S. A. J.). **Plant pathology.**—*Rep. Res. Div. Minist. Agric., Sudan, 1952–1953*, pp. 56–67, 1955. [Received August, 1957.]

In this report [cf. 35, p. 423] it is stated that during 1952–3 cotton blackarm (*Xanthomonas malvacearum*) [cf. 36, p. 185], though present in most parts of the Gezira, was severe only in a few small patches. Cotton leaf curl virus [35, p. 423] infected Sakel cotton in the northern Gezira, but was not serious. Severe attacks of covered smut of sorghum (*Sphacelotheca sorghi*) [33, p. 411] occurred in some localities where untreated seed had been sown; *S. cruenta* [cf. 32, p. 90], *S. reiliana* [cf. 34, pp. 295, 364], and *Tolyposporium ehrenbergii* [cf. 32, p. 118] were occasionally present and *Colletotrichum graminicola* [cf. 32, p. 90; 34, p. 364] was widespread. An unidentified leaf curl virus disease of tomatoes and cotton leaf curl virus on *Hibiscus esculentus* probably caused considerable losses. In the Northern Province, heavy losses of broad beans were caused by powdery mildews (*Leveillula taurica* and probably *Erysiphe polygoni*); weekly dusting with powdered commercial sulphur gave moderate control in a small experimental plot, increasing yields by 16.5 per cent. *Puccinia graminis* and *P. triticea* were widespread on wheat in parts of the Northern Province.

Fungi recorded for the first time in the Sudan included *Alternaria crassa* on *Datura stramonium*, *A. ricini* on castor [*Ricinus communis*], *Cercospora ficina* on fig, *C. hyalina* on rose, *Neurospora sitophila* on cotton, *P. polysora* on maize [map 237], and *Ramulispora sorghi* on sorghum and *Sorghum purpureo-sericeum*.

SCHREIER (O.). **Das Auftreten wichtiger Schadensursachen an Kulturpflanzen in Österreich im Jahre 1956.** [The occurrence of important causes of injury to cultivated plants in Austria in the year 1956.]—*PflSchBer.*, 18, 3–5, pp. 41–49, 1957. [English summary.]

This paper lists the plant diseases encountered in Austria in 1956, indicating their severity and prevalence. A virus disease [not specified] of red clover, the first observed in Austria, is mentioned as having occurred, especially in breeding plots.

Outbreaks and new records.—*F.A.O. Pl. Prot. Bull.*, 5, 9, pp. 145–146, 1957.

A. P. MISRA states that during a recent survey of plant diseases in the Andaman Islands, India, he found perithecia of *Physalospora* [*Glomerella*] *tucumanensis* [cf. 35, p. 280; 36, p. 275] on mature leaves of sugar-cane.

The Plant Protection Service, Rome, reports that greenhouse tomato plants in the Province of Pisa were attacked by a virus disease the symptoms of which differed from those hitherto seen on tomatoes in other parts of Italy; it was probably due to tobacco mosaic virus.

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